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A REVIEW OF THE GENERA AND SPECIES OF AMERICAN SNAKES, NORTH OF MEXICO.

BY ARTHUR ERWIN BROWN.

In recent years, investigation of the lower groups in classification has largely taken the form of observing and noting the most minute variations, occurring in however small numbers. Among snakes, this method has been carried to such an extreme that Prof. Cope's "Characters and Variations of North American Snakes"[1] contains the names of twenty-three species and subspecies which were founded upon one, or at most two specimens each.

Two propositions, both fundamentally correct, have contributed to this result: first, that a knowledge of the laws under which new forms are developed is to be best gained by a study of variations; and second, that subspecies are an essential part of classification. As a general truth the first proposition is unassailable, but there appear to be good reasons why limits should be placed upon its application to the present group and why a cautious valuation should here be made of minor variations. This should be true if it can be shown that unmeaning departures from type are especially common among its members.

It is a law of organisms that a high degree of instability is associated with degenerative processes. That the serpents, as a whole, are a degenerate group is probable, and while some lines among them have become much specialized, there are large numbers of small and degraded forms, always highly variable, which can be connected with higher types.

It is, furthermore, a morphological fact that where repetition of parts is the rule, variability, in number at least, is to be looked for.[2] Among snakes, generic and specific characters are chiefly

[1] *Proc. U. S. National Museum*, 1892, pp. 589–684.

[2] A very simple summary of a long series of observed facts is contained in Bateson's *Materials for the Study of Variation*, p. 571 (London, 1894): "It is perhaps true that, on the whole, series containing large numbers of undifferentiated parts more often show Meristic Variation than series made up of a few parts much differentiated, but throughout the evidence a good many of the latter class are nevertheless to be seen."

found in the teeth, in the plates upon the head, and in the number and form of the rows of body scales; all of these are numerous, and variability under the above law is common.

Color is largely used in specific, and almost wholly in subspecific determination, and this, too, we should expect to find inconstant in a group whose structure is such that the whole exterior is brought into close contact, surface or subterranean, with earth, sometimes swamp and sometimes desert sand, and whose slow metabolism brings such physiological activities as temperature, nutrition and epidermal repair into close dependence upon external conditions.

There is, again, a class of anomalies not uncommon in this group, such as are shown at times in genera like *Coluber* or *Zamenis*, in which the young of some species are spotted or cross-banded, becoming striped when adult. Here, occasionally, more or less of the juvenile pattern is retained, showing through, as it were, the later stage. Examples of such are *Coluber guttatus sellatus* Cope and *C. rosaceus* Cope. This class of variations is purely physiological, and when occurring in isolated cases, has no more zoölogical significance than the occasional retention to maturity of the youthful livery of spots in lions.

Aside from anomalies, there are characters which are too variable, normally, to be of use except in broad definitions. Form and proportions, both of the whole and of parts, vary considerably; among those which change with growth are the relative length of the tail (which also varies with sex), and the reciprocal proportions of some head plates; breadth of head and stoutness of body change to an extraordinary degree with nutritive conditions, a fact which can be best learned by observation of snakes kept in captivity.[3]

The system of trinomials has added greatly to the facilities for expressing the relationship of transitional forms, but while its value is fully conceded, so also must be the existence of the danger which has attended and not infrequently overtaken it—that the very ease of its methods may lead the systematist to overvalue the importance of individual and insignificant variations.

[3] A suggestion as to the possible origin of occasional specimens presenting mixed characters, is that among snakes which breed in captivity there seems to be little or no aversion to cross-breeding. This is especially true of *Eutænia* and *Tropidonotus*, both of which produce young free from the egg, and breed not infrequently.

The chief purpose of the present paper is to inquire into the nature of these variations, and to determine if possible how far they are promiscuous and without meaning, or to what extent they may be believed to fall within those ideas of progressive modification, without which as a guiding principle, the practice of taxonomy is mere byplay. The conception which has directed the inquiry, is that a relatively high degree of constancy and isolation is essential to the recognition of a species; and that variations, to be of subspecific value, must be of such a character as to offer reasonable grounds for the belief that they are stages of change; an important part of such character being that they shall occur in sufficient numbers to constitute centres, so to speak, upon lines leading from established forms.

The color descriptions have in a large proportion of cases been taken from the living snake; to which it may be added that in addition to the alcoholic series to which I have had access, including that of the Academy of Natural Sciences of Philadelphia, which now contains the whole private collection of the late Prof. Cope, nearly four thousand living specimens of North American snakes have passed under my observation, in the course of identifying the large amount of material in this group which comes into possession of the Zoölogical Society of Philadelphia.

The more recent works which treat with modern methods, of the whole field of North American snakes, are the paper of Prof. Cope, above referred to,[4] and Mr. G. A. Boulenger's *Catalogue of Snakes in the British Museum* (1893–96).

With neither of these distinguished naturalists am I able to find myself in full accord; the one appearing to me to err in excess of analysis, quite as much as the other does in the opposing method.

The literature has been so fully worked out by Mr. Boulenger,

[4] Since the completion of the present paper (October, 1900), the *Report of the U. S. National Museum* for 1898 has appeared, containing Prof. Cope's posthumous work on North American scaled reptiles (Serpentes, pp. 688–1198). I find that few of the conclusions which I had reached are thereby altered, for the chief additions to his previous paper of 1892 result from the introduction of characters drawn from the male generative organ. These were not made use of in the present paper, for examination of much of Cope's material, and some further investigations of my own, had satisfied me that much verification and extension remains to be done before their value in generic determination can be established. Such changes as I have made have been introduced into the text, and references to the paper are given as "Cope, Rep. Nat. Mus.," "Cope, *l.c.*," indicating the previous paper, above cited.

that the references given in this paper are such only as are necessary to historical exactness, being in most cases to the original description; to the works of Cope and Boulenger cited; to Baird and Girard's *Catalogue of North American Snakes* (1853); to some late papers by Mr. Stejneger, and to a valuable paper by Mr. Van Denburg on the reptiles of the Pacific coast.[5]

GLAUCONIIDÆ.

GLAUCONIA, Grey.

Cat. Lizards, Br. Mus., 139 (1845); *Rena* B. and G., Cat. Serp. No. Am., 149 (1853); *Glauconia* and *Rena* Cope, Proc. U. S. Nat. Mus., 1892, 589, 590; *Glauconia* Boul., Cat. Snakes Br. Mus., I, 59.

No maxillary teeth; rostral large, projecting; one nasal, divided or half-divided and touching the lip; eyes covered with scales; an ocular which reaches the lip; a median row of scales extending to the rostral; body surrounded with cycloid scales; anal entire; body cylindrical; tail short and blunt; head not distinct.

Hab.—Africa; southwestern Asia; tropical America.

Two species are known in the United States:

Supraoculars present, ... 1. *G. dulcis.*
Supraoculars absent, ... 2. *G. humilis.*

Glauconia dulcis B. and G.

Rena dulcis B. and G., *l. c.*, 142; *Glauconia dulcis* Cope, *l. c.*, 590; Boul., *l. c.*, I, 65; *Leptotyphlops dulcis* Stej., Proc. U. S. Nat. Mus., 1891, 501; *Glauconia dissecta* and *G. dulcis* Cope, Rep. Nat. Mus., 716, 717.

Size small; two or three pairs of plates in front of frontal; a supraocular plate on each side with a smaller one between them; nasal divided; scales in 14 rows. Length about 200 mm. (tail about one-twentieth). Pale brown above; white on belly.

G. dissecta Cope, may prove to be distinct, but the inconstancy of the head shields in these low, burrowing forms is a strong presumption against it.

Hab.—Texas, New Mexico and Mexico.

[5] *Occasional Papers of the California Academy of Science*, No. 5, 1897.

Glauconia humilis B. and G.

Rena humilis B. and G., *l. c.*, 143, and Cope, *l. c.*, 590; *Glauconia humilis*, Boul., *l. c.*, I, 70, and Cope, Rep. Nat. Mus., 719; *Rena humilis* Stej., *l. c.*, 501; *Siagonodon humilis* Van Den., *l. c.*, 150.

Like *G. dulcis*, but no supraoculars; the oculars being separated by one shield instead of three.

Hab.—Arizona, southern and Lower California; Mexico.

BOIDÆ.

LICHANURA Cope.

Proc. Acad. Phila., 1861, 304; *l. c.*, 590; Rep. Nat. Mus., 722; Boul., *l. c.*, I, 129.

Head covered with scales; two nasals; no labial pits; eye with vertical pupil; body short and stout; tail short, blunt and slightly prehensile; subcaudals undivided.

Hab.—Southwestern North America.

Lichanura roseofusca Cope.

Proc. Acad. Phila., 1868, 2; *L. roseofusca* and *orcutti* Cope, *l. c.*, 591, 592, and Rep. Nat. Mus., 724, 726; *L. orcutti* Stej., Proc. U. S. Nat. Mus., 1889, 96; *L. trivirgata* (part) Boul., *l. c.*, I, 129.

Head slightly distinct; rostral prominent; eye surrounded with a ring of nine or ten scales; anterior nasals in contact; 4–6 small plates behind the nasals, rest of head covered with small scales; body cylindrical; scales small and smooth, in 33–43 rows; ventrals 224–241; subcaudals 39–47. Total length about 980 mm. (tail 110).

Grayish or brownish above, sometimes with three rather indistinct brown stripes on the body; belly yellowish or reddish, irregularly mottled with brown.

Mr. Stejneger has clearly shown the great variability of scutellation in these snakes,[6] and the very wealth of observation which he brings forward destroys the value of the chief character upon which *L. orcutti* rests; the presence of an additional loreal. In addition to which is the fact that in the *Boidæ* these plates are so inconstant as to be without classificatory meaning.

Hab.—Southern California and Arizona. A closely related species, *L. trivirgata*, is found in Lower California.

[6] *Proc. U. S. Nat. Mus.*, 1891, p. 511.

CHARINA Grey.

Cat. Sn. Br. Mus., 113 (1849); Cope, *l. c.*, 592 ; Boul., *l. c.*, I, 130.

Anterior teeth longest; head covered with shields; a frontal plate ; two nasals, eye small with vertical pupil; tail short, not prehensile; subcaudals undivided.

Hab.—Western coast of North America.

Charina bottæ Blainville.

Tortrix bottæ Blain., Nouv. Ann., 1834, 57, Pl. XXVI, fig. 1; *Wenona plumbea* and *isabella* B. and G., *l. c.*, 139, 140 ; *Charina bottæ* Cope, *l. c.*, 592, and Rep. Nat. Mus., 728 ; *C. bottæ* Boul., *l. c.*, I, 130.

Body short and stout; rostral prominent; two nasals, the anterior frequently fused with the internasals; loreal sometimes fused with prefrontals; head plates variable; upper labials 8–11; scales smooth in 37–49 rows; ventrals 192–211; anal entire; subcaudals 20–37, mostly entire. Total length about 550 mm. (tail 50). Grayish to brownish above, yellow beneath.

In the present genus Mr. Stejneger has again demonstrated the worthlessness of characters drawn from the scales,[1] although he prefers to provisionally retain *plumbea* B. and G. The difference of four rows of scales between the type of *bottæ* and the minimum of *plumbea* is much less than the normal range of variability in almost every known species of *Boidæ*.

Hab.—Oregon to Lower California and Nevada.

Charina brachyops Cope.

Proc. U. S. Nat. Mus., 1888, 88 ; *l. c.*, 592, and Rep. Nat. Mus., 727 ; Boul., *l. c.*, I, 131.

One specimen only is known of this species. It differs from *bottæ* in that the posterior prefrontal forms a part of the orbit, and the loreal is absent, leaving the postnasal in contact with the preocular. The constancy of these characters is not known, and the form is retained provisionally.

Hab.—Point Reyes, California.

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[1] *Proc. U. S. Nat. Mus.*, 1890, p. 177.

COLUBRIDÆ.[8]

Key to the Genera.

I. AGLYPHA :

A.—Posterior dorsal hypapophyses present:

a.—Maxillary teeth longer behind; scales keeled:

a^1.—Anal entire; no scale pits, ... EUTÆNIA.

b^1.—Anal divided:

2 internasals; scale pits present, TROPIDONOTUS.

2 internasals; no scale pits; keeled only on tail, SEMINATRIX.

1 internasal; no scale pits; keeled only on tail, HELICOPS.

b.- Maxillary teeth equal; scales keeled:

a^1.—Anal entire, ... TROPIDOCLONIUM.

b^1.—Anal divided:

a^2.—Loreal absent, ... STORERIA.

b^2.—Loreal present:

a^3.—1 nasal; 1 preocular, . . CLONOPHIS.

b^3.—2 nasals; preocular absent:

2 internasals, ... AMPHIARDIS.

1 internasal, ... HALDEA.

B.—Posterior dorsal hypapophyses absent:

a.—Maxillary teeth equal, or nearly so:

a^1.—Anal entire:

a^2.—Scales smooth; size large:

Snout normal; scales less than 17 rows, SPILOTES.

Snout elongate; scales more than 25 rows, RHINECHIS.

b^2.—Scales smooth; size small and slender; no loreal; pre- and postfrontals touching labials, STILOSOMA.

c^2.—Scales keeled; size large; 4–6 prefrontals, PITYOPHIS.

b^1.—Anal divided:

a^2.—Scales keeled:

2 nasals; size large; spotted or striped, COLUBER.

1 nasal; size small; color green, CYCLOPHIS.

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[8] Although not strictly followed here, the plan of serial arrangement of the genera of *Colubridæ* adopted by Mr. Boulenger possesses a decided advantage, in that it does not pretend to a knowledge of close affinities which we have not gained.

b^2.—Scales smooth:
a^3.—Loreal and preocular present:
1 preocular; 1 nasal; color not green, CONTIA.
1 preocular; 1 nasal; color green, LIOPELTIS.
2 preoculars; 2 nasals, DIADOPHIS.
b^3.—Preocular absent:
2 internasals; 2 nasals; size small, VIRGINIA.
2 internasals; 1 nasal; large; bluish-black with red stripes, . . ABASTOR.
1 internasal; 1 nasal; large; bluish-black with red spots, . . FARANCIA.
1–2 or no internasals; 1 nasal; small; brown, ... CARPHOPHIS
c^3.—Loreal absent:
Nasal usually fused with first labial, FICIMIA.
Nasal usually fused with internasal, CHILOMENISCUS.
b.—Maxillary teeth longer behind; no interspace:
a^1—Anal divided:
Rostral normal, ... ZAMENIS.
Rostral with projecting edges, SALVADORA.
b^1.—Anal entire:
a^2.—2 nasals:
Rostral normal; subcaudals divided OPHIBOLUS.
Rostral projecting; subcaudals entire, RHINOCHILUS.
b^2.—1 nasal; rostral projecting, CEMOPHORA.
c.—Maxillary teeth longer behind; an interspace:
a^1.—Anal entire; 3–4 loreals; rostral with projecting edges, ... PHYLLORHYNCHUS.
b^1.—Anal divided; 1 loreal:
Scales keeled; rostral recurved, HETERODON.
Scales smooth, with pits; 2 preoculars, HYPSIGLENA.
Scales smooth, without pits; 1 preocular, RHADINEA.

II. OPISTHOGLYPHA:

a.—Anterior maxillary teeth elongated; 2 loreals, TRIMORPHODON.

b.—Anterior maxillary teeth not elongated:

a^1.—Loreal present:

Scale pits present; eye with vertical pupil, SIBON.

Scale pits absent; eye with round pupil, ERYTHROLAMPRUS.

b^1.—Loreal absent, ... TANTILLA.

III. PROTEROGLYPHA:

Scales smooth in 15 rows; red, with black and yellow rings, ELAPS.

EUTÆNIA B. and G.

l. c., 24 (1853); *Chilopoma* Cope, Wheeler Surv., 543; *Atomarchus* Cope, Am. Nat., 1883, 1300; *Eutænia* Cope, *l. c.*, 645, and Rep. Nat. Mus., 1014; *Tropidonotus* (part) Boul., *l. c.*, I, 192; *Thamnophis* Stej., No. Am. Fauna, 7, 210.[9]

Maxillary teeth smooth, gradually increasing behind, last 2–3 rather abruptly enlarged; head scales normal; 1 loreal; 2 nasals; 2 internasals; body stout to very slender; head distinct; scales keeled, without pits in 17–23 rows; anal entire.

Hab.—North America and Mexico.

The snakes of this genus seem open to every possibility of variation; they exist everywhere in great numbers between the fiftieth and fifteenth degrees of latitude; many of them are of semi-aquatic habits, and the complexity of their pattern easily runs into irregularities, the reckless naming of which has added to the confusion. In *The Primary Factors of Organic Evolution*, p. 63 (1896), Prof. Cope states that he recognizes forty-nine species and subspecies in this genus. Nevertheless, if the systematist will but remember that heredity does not act with the exact methods of mechanical reproduction, certain fairly definite groups may be made out, to which these anomalies may with some certainty be assigned.

[9] In this paper Mr. Stejneger endeavors to substitute for the well-established *Eutænia* B. and G. Fitzinger's name *Thamnophis* (*Syst. Rept.*, p. 26, 1843), and seeks to remove that author's undefined genera from the class of *nomina nuda*, by the statement that "the simple fact that Fitzinger expressly indicated the type of the genus at once removes them from that category." It is true that it does so by rule of the American Ornithologists' Union, but elsewhere, and in my opinion properly, the best usage refuses to sanction these names.

Key to the Species.

I. Body with longitudinal stripes; 2 labials in orbit:
  A.—Body very slender; tail long; lateral stripe on third and fourth rows; all scales keeled, in 19 rows:
    a.—Tail $\frac{1}{3}$ of length, or rather more:
      7 upper labials; brown with 3 yellow stripes, 1. *E. saurita.*
      8 upper labials; olive; dorsal usually absent, 2. *E. sackeni.*
    b.—Tail $\frac{1}{3}$ of length or rather less; 8 upper labials, 3. *E. proxima.*
  B.—Body stouter; tail shorter:
    a.—Scales in 21 rows (occ. 19):
      a^1.—Lateral stripe on third and fourth rows:
        Usually 8 labials; 21 rows, . 4. *E. megalops.*
        Usually 7 labials; occ. 19 rows, 5. *E. radix.*
      b^1.—Lateral stripe on second and third rows; labials 8 (occ. 19 rows and 7 labials), 6. *E. elegans.*
    b.— Scales in 19 rows (occ. 21):
      Usually 8 labials; head broad, . . 7. *E. eques.*
      Usually 7 labials; head narrow, . 8. *E. sirtalis.*

II. Body without stripes; 21 rows:
  1 labial in orbit; brown with 7 rows of spots, 9. *E. multimaculata.*
  2 labials in orbit; brown with small reddish spots anteriorly, 10. *E. rufopunctata.*

Eutænia saurita L.

Coluber saurita L., Syst. Nat., XII, 385 (1766); *Eutænia saurita* B. and G., *l. c.*, 24; Cope, *l. c.*, 650, and Rep. Nat. Mus., 1020; *Tropidonotus saurita* (part) Boul., *l. c.*, I, 212.

Upper labials 7 (rarely 8); oculars 1–3; temporals 1–2 (3); body slender and elongated; tail from .36 to .28 of total length; scales in 19 rows, all keeled; ventrals 150–170; subcaudals 95–120; chocolate brown, with three yellow stripes, the lateral on the third and fourth rows; belly yellow or greenish white; top of head dark brown; a spot on parietals; labials yellow, unmarked. The largest specimen I have seen is in the Academy's collection, from Minnesota, and measures 865 mm. (tail 240). As is usually the case with large examples, the tail is here rather short, about .27.

Hab.—United States, east of Mississippi river.

Eutænia sackeni Kennicott.

Proc. Ac. Phil., 1859, 98; Cope, *l. c.* 650, and Rep. Nat. Mus., 1019; *T. saurita* (part) Boul., *l. c.*, I, 212.

Scutellation and proportions as in *saurita*, but the upper labials are almost invariably 8, instead of 7. The color is greenish olive, or blackish in old specimens, and the dorsal stripe is usually absent, in such cases showing faintly for a short distance behind the head. Total length 710 mm. (tail 255).

Hab.—Florida.

Eutænia proxima Say.

Coluber proximus Say, Long's Exp., I, 187 (1823); *Eutænia proxima* and *E. Faireyi* B. and G., *l. c.*, 25; *E. proxima* Cope, *l. c.*, 650, and Rep. Nat. Mus., 1022; *T. saurita* (part) Boul., *l. c.* I, 212.

Head small; body slender, though stouter and with shorter tail than in the preceding species; upper labials 8; oculars 1–3; temporals 1–2 (3); scales in 19 rows, all keeled; ventrals 165–178; subcaudals 91–115; dark olive or brownish to almost black; dorsal stripe distinct, bright yellow to orange; lateral stripe on third and fourth rows, usually pale or greenish yellow; belly yellow or green, usually without markings; top of head dark, with a parietal spot; labials colored like the belly. Sometimes the dorsal and lateral stripes are of the same color; very dark specimens with such stripes, chiefly from the northern portions of its range, are *faireyi* B. and G. These have often a slightly longer tail, but the differences are not constant. The usual length of large examples from the Mississippi valley is about 800 mm., of which the tail is from .33–.28, but a living specimen lately received by the Zoölogical Society from Pecos, Tex., is 1160 mm. long (tail 280). In this the tail is but .24 of the length, being the shortest I have met with in the species. The dorsal stripe is a rich red.

Hab.—Indiana and Illinois to southern Mexico, and west through Texas. It is not certainly known from east of the Mississippi except in the States named.

Eutænia radix B. and G.

l. c., 34; Cope, *l. c.*, 650, and Rep. Nat. Mus., 1026; *T. ordinatus* var. *radix* Boul., *l. c.*, I, 211.

Body moderately stout; head broad; upper labials 7 (occ. 8); oculars 1–3; temporals 1–2; ventrals 145–170; subcaudals 51–70; scales in 21 or 19 rows, all keeled, the outer slightly. Brown, olive or almost black, with three stripes, the dorsal usually golden

or orange, and the laterals on the third and fourth row, paler yellow; the spots are distinct except when the body color is so dark as to obscure them; belly green to slaty black, with a dark spot at the base of each ventral near the end; parietal spot usually present; labials yellowish or green, heavily margined with dusky. Total length 750 mm. (tail from .20–.24).

Although *radix* usually has 21 rows of scales, four out of five specimens which I have lately received from eastern Missouri have 19.

Hab.—From the Rocky Mountains to Indiana, and the British possessions to Texas. The common species of the plains.

Eutænia megalops Kennicott.

Proc. Acad. Phila., 1860, 330.

Confusion has been introduced into this species by inaccurate description and identification. Typical *megalops* is from Arizona; its Mexican representative is *macrostemma* Kenn. Sundry specimens of the latter Prof. Cope described under the name *insigniarum*, attributing to it markings obscure or wanting, as compared with *macrostemma;* five specimens in the Academy's collection from the City of Mexico, referred by Cope himself to *insigniarum*, do not, however, bear out this statement, and I can see no reason for regarding that form as distinct from *macrostemma*,[10] which probably does not enter the United States.

Eutænia megalops megalops Kennicott.

l. c., 330; *E. megalops* and *E. macrostemma insigniarum* (part) Cope, *l. c.*, 650, 651; *T. ordinatus* var. *macrostemma* (part) Boul., *l. c.*, I, 212; *E. megalops* and *E. macrostemma* Cope, Rep. Nat. Mus., 1025, 1029.

Body moderately stout; tail from .19–.26 of length; eye large; scales in 21 rows, the outer irregularly keeled; upper labials 8 (9), the last one small; temporals 1–2 (3). Brown or ashy with three narrow yellow stripes, the lateral on third and fourth rows; spots present, but not very distinct; belly usually green, bases of ventrals dusky; no parietal nor nuchal spots; a small post-oral crescent sometimes present; labials slightly margined; ventrals 158–164; subcaudals 52–65. Total length of two specimens from Tucson: 740 mm. (tail 140), 690 mm. (tail 140). Three specimens of this snake were sent to the Zoölogical Society in 1891,

[10] In his latest work Cope himself abandons *insigniarum* in favor of *macrostemma*.

from Tucson, Ariz., by Mr. Herbert Brown, and were ascribed by Cope (*l. c.*, p. 651) to *insigniarum*. They were at the time considered by me to be *megalops*. They are now in the Academy's collection, and reëxamination shows that they do not correspond to Cope's description of the first species, nor to five examples of that supposed form from Mexico, but they do agree in all respects with Kennicott's description of *megalops*, except that the spots are slightly more distinct and the upper labials are variable; one has them 8–8, another 8–9, and the third 9–9. In the five *macrostemma* Kenn. (= *insigniarum* Cope) from Mexico, the largest of which measures 990 mm., I find the tail to be about one-fourth of the length, or longer than in most adult *megalops*, which reverses the proportions given by Cope; a smaller *megalops* from Duck creek, New Mexico, in the Cope collection, 610 mm. long, has the tail about .26, and more ventrals and subcaudals, but is otherwise exactly like my Tucson specimens.

Hab.—New Mexico, Arizona and northern Mexico.

Eutænia elegans B and G.

l. c., 34.

As a rule *elegans* has 21 rows of scales and 8 labials, but variations to 19 rows and 7 labials are not uncommon, and in one form 23 rows sometimes appear; oculars 1 (2)–3 (4); temporals 1–2 (sometimes 1–1 or 1–3); posterior chin shields about equal in length to the anterior; head rather small; eye small or moderate; size rather smaller than *E. sirtalis;* tail .19–.25 of length; ventrals 144–180; subcaudals 53–90. The lateral stripe is on the second and third rows; the diversity of color is considerable, and is best stated under subspecific heads. *E. elegans* is a western form, ranging from the central plains to the Pacific coast.

Key to the Subspecies.

a.—Post-oral crescent absent:

Color dark; spots and lat. stripe often indistinct, 1. *E. e. elegans.*

Color lighter; spots encroaching on stripes, 2. *E. e. vagrans.*

Often 2 preoculars and 23 rows; otherwise like *vagrans*, 3. *E. e. biscutata.*

b.—Post-oral crescent present:

Spots and stripes distinct, ... 4. *E. e. marciana.*

Spots and stripes indistinct or absent, . 5. *E. e. couchi.*

Eutænia elegans elegans B. and G.

E. elegans B. and G., *l. c.*, 34; *E. e. elegans*, *E. e. plutonia* and *E. e. brunnca* Cope, *l. c.*, 653, 654, and Rep. Nat. Mus., 1035, 1037; *T. vagrans* (part) and *T. ordinatus* var. *infernalis* (part) Boul., *l. c.*, I, 202, 207; *Thamnophis elegans* (part) Van Den., Occ. Papers Cal. Ac. of Sc., No. 5, 207 (1897); *Thamnophis elegans* Stej., No. Am. Fauna, No. 7, 211.

Color usually dark brown, olive or black, obscuring the spots; dorsal stripe moderately wide and distinct, whitish, yellow or red; laterals usually, but not always, distinct; there are no nuchal spots and the labials are without dark margins; belly generally light, with a distinct yellowish tinge on the throat; eye moderate; posterior chin shields about equal the anterior; ventrals 155–172; subcaudals 57–80.

E. plutonia Yarrow was based upon two melanistic individuals, one from Arizona and the other from Washington.

I can see no valid reason for retaining *E. brunnea* Cope.

Hab.—California to Oregon.

Eutænia elegans vagrans B. and G.

E. vagrans B. and G., *l. c.*, 35; *E. e. lineolata* and *E. e. vagrans* Cope, *l. c.*, 655, 656, and Rep. Nat. Mus., 1038, 1039; *T. vagrans* (part) Boul., *l. c.*, I, 202; *Thamnophis vagrans* Stej., *l. c.*, 213; *T. vagrans* (part) Van Den., *l. c.*, 210.

E. vagrans has almost always 21 rows and 8 upper labials; ventrals 153–172; subcaudals 53–91; the eye is smaller than in *elegans* and the posterior chin shields either equal the anterior in length or are rather less. Color, greenish yellow or ashy to brown; the spots are rather small and numerous, they are usually distinct and often tend to join together, forming zigzag cross-bands; they usually encroach upon the stripes, which are whitish or yellow; the belly is frequently marbled with slate color, especially in the centre; head brown or blackish with parietal spot and nuchal blotches generally present; labials rarely dark bordered and then but narrowly.

Hab.—The region of the plains and the Pacific coast from southern California to Oregon.

Eutænia elegans biscutata Cope.

E. biscutata Cope, Proc. Acad. Phila., 1883, 21; *l. c.*, 651, and Rep. Nat. Mus., 1032; *T. vagrans* (part) Boul., *l. c.*, I, 202; *Thamnophis vagrans biscutata* Van Den., *l. c.*, 212.

This form was established by Prof. Cope upon a melanistic specimen of small size, with two preoculars and 21–22 rows of scales.

Mr. Van Denburgh has examined a number which have 2, 3, and occasionally 1 preocular; sometimes 7 labials and 21–23 rows; all these being from Washington and Oregon. Allowing for doubt as to the significance of these variations, the form may be provisionally retained as a subspecies of *E. elegans.*

Eutænia elegans marciana B. and G.

E. Marciana B. and G., *l. c.*, 36; *E. e. marciana* Cope, *l. c.*, 656, and Rep. Nat. Mus., 1045; *E. nigrolateris* A. Brown, Proc. Acad. Phila., 1889, 421; *T. ordinatus* var. *marcianus* Boul., *l. c.*, I, 211.

Largest of the subspecies; 21 rows of scales; upper labials 8; temporals 1–2 (3); posterior chin shields rather longest; ventrals 149–163; subcaudals 53–85. Light brown or ashy; dorsal stripe narrow and not always distinct; laterals of the same shade, but frequently merged into the belly color; spots distinct and conspicuous, sometimes encroaching a little upon the stripes; belly light with a dark spot at the base of each ventral near the end; nuchal and parietal spots present; labials heavily bordered, and a conspicuous pale post-oral crescent.

E. nigrolateris A. Brown was based upon an individual from Tucson, the most striking character of which, apart from obvious abnormalties, was the extension of the preocular upward to meet the frontal. Since then I have examined several *marciana* which exhibit a tendency in this direction.

Hab.—Central Texas to western Arizona.

Eutænia elegans couchi Kennicott.

E. couchii Kenn., Pac. R. R. Rep., 10 (1857), and *E. hammondii* Kenn., Proc. Acad. Phila., 1860, 332; *E. e. couchii* Cope, *l. c.*, 656, and Rep. Nat. Mus., 1042; *T. ordinatus* vars. *couchii* and *hammondii* Boul., *l. c.*, I, 210; *Thamnophis hammondii* Van Den., *l. c.*, 212.

Moderately stout; 21 rows of scales (occ. 19); upper labials 8 (rarely 7); posterior chin shields longest; ventrals 159–173; subcaudals 68–85. Grayish brown, dark brown or olive; dorsal stripe narrow, indistinct or absent; lateral stripe not very distinct; spots almost always absent, although a few black dots are sometimes visible on the scales; belly yellowish to black; labials dark bordered; nuchal blotches present; post-oral crescent less distinct than in *marciana.*

Hab.—California and Arizona.

Eutænia eques Reuss.

Coluber eques Reuss., Mus. Senck., I, 152;[11] *E. cyrtopsis, E. c. ocellata* and *E. aurata* Cope, *l. c.*, 656, 659; *T. ordinatus* var. *eques* (part) Boul., *l. c.*, I, 209; *E. eques* Cope, Rep. Nat. Mus., 1049.

Body moderately stout; head broad behind; eye large; scales in 19 rows, the outer smooth or faintly keeled; upper labials 8; oculars 1–3; temporals 1–3; posterior chin shields much the longest. Brownish olive; dorsal stripe narrow, said to be red in life; laterals paler, on the second and third rows; two series of large black spots between the dorsal and lateral stripes; anteriorly and on the middle of the body the spots often fuse transversely, forming zigzag bands; the spots encroach considerably upon the stripes, sometimes breaking through the lateral one, especially anteriorly; a third row of spots on the outer row of scales and the ends of the ventrals; belly whitish, each scutum black at the base on the ends; top of head olive; large and conspicuous nuchal blotches; labials yellowish white bordered with black; chin yellowish; ventrals 151–169; subcaudals 64–74; tail about .23 of length.

According to Dr. Coues, this species grows to quite the size of *E. sirtalis* around Fort Whipple, Ariz.

E. cyrtopsis ocellata Cope was founded upon specimens collected by G. W. Marnock at Helotes, Tex., in which the lateral stripe is cut completely through in places by the lower row of dorsal spots. There are two specimens in the Cope collection from the same locality and collector; one in every way corresponds with Kennicott's description of *cyrtopsis*, the other is *ocellata* for about four inches behind the head, and *eques* on the rest of the body.

It is not easy to reconcile the original description of *E. aurata* Cope with the type and only specimen, which is simply a well-fattened and stout *eques*, with the spots obscure, though indicated. The specimen is mutilated and the brown color has disappeared in the preservative fluid, but in every character not dependent upon prominence of the spots, it belongs to the present species.

Hab.—Western Texas to Arizona; northern Mexico.

Eutænia sirtalis L.

Coluber sirtalis L., Syst. Nat., Ed. X, 222 (1758).

This is rather a stout species; head distinct and moderately large; tail from .20 to .25 of the length; oculars 1 (2)–3 (4);

[11] I have been unable to verify this reference, and it is adopted here on the authority of Boulenger and Cope.

temporals 1 anterior, with 1, 2 or 3 in the second row; upper labials almost always 7, but in one subspecies 6 or 8; posterior chin shields longest; scales in 19 rows (occ. 17 or 21), the outer row smooth or faintly keeled; ventrals 138–165; sub-caudals 55–85. The color range is very great: bluish, green, olive, brown and almost black, usually with a dorsal stripe and a lateral on the second and third rows, and three rows of spots on the back and side; any or all of these may be absent; belly yellow, green or black, generally with a roundish spot near the end of each ventral; the head is dark above, usually with a parietal spot; labials margined with dusky. Maximum length about 900 mm.

Hab.—The whole of North America, wherever snakes are found, and extending into Mexico.

Key to the Subspecies.

Green, with spots, usually no stripes, . . . 1. *E. s. ordinatus.*
Stripes and spots present; no red on sides, . . 2. *E. s. sirtalis.*
Stripes and spots often obscure; generally red on sides,
3. *E. s. parietalis.*
Color very dark; 3 stripes; belly blue-black, 4. *E. s. pickeringi.*
Color dark, 3 stripes; head small; often 17 rows,
5. *E. s. leptocephala.*

Eutænia sirtalis ordinata L.

Coluber ordinatus L., Syst. Nat., Ed. XII, 379 (1766); *E. s. ordinata* and *E. s. graminea* (part) Cope, *l. c.*, 662, and Rep. Nat. Mus., 1066, 1067; *T. ordinatus* forma *typica* Boul., *l. c.*, I, 206.

Green above; usually without stripes; spots generally distinct, but in some cases obscure; belly greenish white; 19 rows of scales; 7 labials.

Hab.—United States east of Mississippi river.

Eutænia sirtalis sirtalis L.

Coluber sirtalis L., Syst. Nat., Ed. X, 222 (1758); *E. s. sirtalis, E. s. graminea* (part), *E. s. semifasciata, E. s. obscura* and *E. butleri* Cope, *l. c.*, 662, 663, 651, and Rep. Nat. Mus., 1066, 1067–74, 1031; *T. ordinatus* var. *sirtalis* (part) and var. *butleri* Boul., *l. c.*, I, 206, 212; *Thamnophis butleri* Stej., Proc. U. S. Nat. Mus., 1894, 593; *E. brachystoma* Cope, Am. Nat., 1892, 964, and Rep. Nat. Mus., 1056.

This subspecies has almost always 19 rows of scales and 7 upper labials; oculars 1–3; temporals usually 1–2 (3), occasionally 1–1; the color is variable, but is usually brown, bluish or green, with the three light stripes well defined; spots rather large and usually

distinct; top of head dark; parietal spot present; labials yellowish or greenish, with dark borders; ventrals 138–165; subcaudals 61–80. Length, 750 to 950 mm., of which the tail is from .20 to .25.

Some of the specimens referred by Prof. Cope to *E. s. graminea* have the stripes more or less distinctly marked; these I assign to the present form.

E. s. semifasciata Cope is based upon a few individuals in which the spots are somewhat confluent anteriorly—a disposition by no means uncommon in many of the species of this genus.

Specimens in the Academy's collection labeled *obscura* by Cope plainly show the dorsal spots, although not prominently; similar individuals may be found in almost any lot of *E. s. sirtalis* collected in one locality; western examples of *obscura* are probably referable to *E. s. parietalis*. The only thing which appears to me out of the ordinary about the form, is that any one should have thought of giving it a name.

The basis of *E. butleri* Cope was a specimen from Richmond, Indiana, the special characters of which were: the great width of the lateral stripe, covering three rows of scales; the black borders of the stripes; the absence of defined spots and of markings on the head and labials, and the presence of but one temporal in the second row. To these distinctions Mr. Stejneger has added, from a second specimen in the National Museum, that the eye is strikingly small. I have not seen the type specimen, from Richmond, but two others (No. 6523, Ac. coll.) from southeastern Indiana, labeled by Cope *E. butleri*, present intermediate characters. In these examples, the lateral stripe nowhere "covers" the second, third and fourth rows, being everywhere restricted to the lower half of the fourth, and anteriorly, where it most extends on the fourth, it barely covers the upper margin of the second, while on the hinder half of the body it is almost wholly on the second and third. The spots are not entirely absent, though obscure against the dark body color, and in one of the specimens they form narrow broken borders to the stripes, as in many of Cope's *obscura;* the posterior labials have narrow dark borders, and there is an indistinct parietal spot. Both have two temporals in the second row; in one the lower is narrow and in contact with the anterior one only by its point; in the other, the lower is much the

largest; in any event *E. s. sirtalis* not infrequently has but one second temporal.

Examination of the type of *E. brachystoma* Cope leaves little ground for regarding it as anything more than a dwarfed and shortened *E. s. sirtalis*. The colors appear to have faded; on stretching the skin, indications of the dorsal spots appear, and the ventral spots of *sirtalis* are not absent, as stated in the description, but are plainly present, though small. The body is disproportionately short, as is the mouth, which, instead of reaching back as far as the hinder end of the parietals, ends quite in advance of that point; with which shortening the reduced number of labials is doubtless correlated.

Hab.—*E. s. sirtalis* is found over the United States and southern Canada, east of the great plains, but is chiefly from east of the Mississippi river.

Eutænia sirtalis parietalis Say.

Coluber parietalis Say, Long's Exp., I, 186 (1823); *E. s. parietalis*, *E. s. concinna*, *E. s. tetratænia*, *E. s. dorsalis*, *E. s. obscura* (part), *E. elegans ordinoides* and *E. infernalis infernalis* (part) Cope, *l. c.*, 654-664, and Rep. Nat. Mus., 1074-1081; *T. ordinatus* var. *sirtalis* (part) and *T. o.* var. *infernalis* (part) Boul., *l. c.*, I, 206, 207; *Thamnophis parietalis* Stej., No. Am. Fauna, No. 7, 214; Van Den., *l. c.*, 201.

This subspecies has usually 19 rows and 7 labials; occasional examples have 21 rows and the labials are sometimes 8; the color is dark brown, bluish, black or even green; dorsal stripe distinct and variable in color, white, blue, yellow or red; the laterals are distinct owing to the presence of more or less of the dark body color on the outer rows and ends of the ventrals; the upper row of spots commonly fuses into a longitudinal black stripe, with which the lower row sometimes connects above; the skin on the sides is bright red, sometimes extending on to the scales so that the sides appear to have a denticulated pattern of black and red. This is often seen in living snakes only when the scales are stretched apart, but in alcoholic specimens the spaces between the lower row of spots seem to fade rapidly to white, and the denticulated pattern is then very distinct. The belly is yellow, green or bluish slate, and the spots near the ends, though small, are plainly to be seen at the base of each ventral; top of head olive or reddish yellow; an occasional labial with a narrow dark margin.

E. s. tetratœnia Cope was founded upon specimens which had been many years in alcohol. One in the Academy's collection (No. 6085) from Puget Sound, formerly known as *E. concinna*, seems to have had the red lateral spaces formed into a longitudinal stripe, extinguishing the upper portion of the lower row of spots. A small snake in the same jar, of the same date and locality, is an ordinary *parietalis*.

Considering the amount of variability in the joining of the spots in *parietalis*, and also the uncertain way in which the red pigment dissolves in alcohol, I am not disposed to attach much importance to slight differences in these very old specimens.

E. dorsalis B. and G. has the upper black dorsal stripe somewhat narrower than is usual in those examples of *parietalis* in which the spots fuse into a stripe.

E. ordinoides B. and G. is said to have the sides chestnut in life, instead of bright red, but this difference is trivial and old alcoholic specimens are distinguishable only when they have 21 rows of scales and 8 labials; but as *ordinoides* and *parietalis* vary into each other in scutellation, I see no good reason for separating them, or for assigning the former to *E. elegans*, as is done by Cope.

Whatever may or may not have been *infernalis* Blainville, I have never seen a living specimen which could be referred with certainty to *infernalis* B. and G. or Cope, and I am persuaded that those so called belong in part to the present form and in part to *E. elegans*.

The dimensions of *parietalis* are about as in *E. s. sirtalis*.

Hab.—From central California north to Washington and Oregon, and through the plains from Montana to Texas.

Eutænia sirtalis pickeringi B. and G.

E. Pickeringii B. and G., *l. c.*, 27; *E. s. pickeringii* and *E. s. trilineata* Cope, *l. c.*, 665, and Rep Nat. Mus., 1082, 1083; *T. o.* var. *infernalis* (part) Boul., *l. c.*, I, 207; *Thamnophis parietalis pickeringi* Van Den., *l. c.*, 204.

Color very dark, blackish brown or black, with three narrow light stripes; belly dark greenish or slate color; throat lighter. *E. s. trilineata* Cope is simply this form with the stripes inconsiderably wider.

Hab.—Washington, Oregon and western Montana.

Eutænia sirtalis leptocephala B. and G.

E. leptocephala B. and G., *l. c.*, 29; *E. atrata* and *E. cooperi* Kenn., Pac. R. R. Survey, 296 (1860); *E. leptocephala* and *E. infernalis vidua* Cope, *l. c.*, 658, 660, and Rep. Nat. Mus., 1058, 1055; *T. leptocephalus* (part) and *T. o.* var. *infernalis* (part) Boul., *l. c.*, I, 201, 208; *Thamnophis leptocephalus* Stej., *l. c.*, 214; Van Den., *l. c.*, 205.

Size smaller and tail relatively a little longer than in *E. s. sirtalis;* body moderately stout; head small and narrow; scales in 17–19 rows; preoculars 1 or 2 (3); postoculars 3 or 4; temporals 1–1 or 1–2; upper labials usually 7, but sometimes 6 or 8; olive, greenish or blackish brown, generally with three light stripes; these are variable and sometimes absent; the three rows of spots are hardly to be seen in dark specimens; belly yellowish, greenish or dark slate; head dark, with a parietal spot; labials yellow or olive, sometimes narrowly bordered; ventrals 139–152; subcaudals 52–77. Total length of one specimen 724 mm. (tail 164); of another 723 mm. (tail 138). Nine specimens from Washington and British Columbia, collected by Samuel N. Rhoads, have 17 rows of scales; nearly all have 7 labials; one has them 7–8, and one has 8; the preoculars are 1, 2 or 3, with 2, 3 or 4 postoculars. In all the color is dark brown or black, with the spots barely visible and the lateral stripe indistinct. Individuals with 19 rows and 7 labials so closely resemble some forms of *parietalis*, and in fact some Eastern *E. s. sirtalis*, that I cannot regard it as more than a subspecies.

In *E. infernalis vidua* Cope has merely redescribed two of Kennicott's original specimens of *E. atrata*, although he does not mention the fact, while referring to the resemblance. One of Kennicott's specimens (No. 6359 Ac. coll.; original number 970), marked *vidua* by Cope, better accords with the first description than with the later one. It has 19 rows at a point about three inches behind the head, where the number rarely reaches a maximum, but on the rest of the body it has 17 as stated by Kennicott;[12] upper labials 8; oculars 1–3; temporals 1–2; ventrals 155; subcaudals 65; length 622 mm. (tail 138), or .22 of the length, being considerably shorter than the proportion given by Cope. A second specimen (No. 6584 Ac. coll.), also from San Francisco, has the dorsal stripe somewhat narrower; spots obscure, but visible

[12] Curiously enough, Cope in his last paper, p. 1059, refers to this irregularity in the number of rows as being sometimes found in *leptocephala*.

against the dark body color, and has the belly rather lighter, with clear indications of a lateral stripe on the second and third rows; ventrals 143; subcaudals 63; length 440 mm. (tail 108, or .245 of the length). In one the labials are dark lead color, in the other yellowish green, both with traces of narrow dark borders; the chin shields are not subequal in these specimens, but the hinder are noticeably the longest, as in most *leptocephala*, and the eye is small, as in that form. Mr. Van Denburgh refers *vidua* to *elegans*, but the totality of characters in the two which I have examined comples me to regard them as *leptocephala*, to which, in fact, Cope himself has already referred *atrata*, of which *vidua* in no event could be more than a synonym.

Hab.—British Columbia, Oregon, Washington and California north of San Francisco.

Eutænia multimaculata Cope.

Atomarchus multimaculatus Cope, Am. Nat., 1883, 1300; *E. multimaculata* Cope, *l. c.*, 665, and Rep. Nat. Mus., 1087; *T. multimaculatus* Boul., *l. c.*, I, 214.

Posterior maxillary teeth shorter than in the preceding species; occasionally an azygous plate between the internasals; scales in 21 rows; upper labials 8, the fourth only touching the eye; oculars 2–3; temporals 1–3.

Grayish or brown above, with about 7 longitudinal series of brown or reddish spots with lighter centres, some of which often unite transversely; ventrals yellowish with dark edges. Length about 708 mm.

Hab.—Southern New Mexico; northern Mexico.

Eutænia rufopunctata Cope.

Chilopoma rufopunctata Cope, Wheeler Survey, 544 (1875); *E. rufopunctata* Cope, *l. c.*, 666; *T. rufopunctata* Boul., *l. c.*, I, 214.

Teeth as in *multimaculata;* head narrow; rostral large and projecting; 21 rows of scales; upper labials 8, fourth and fifth touching the eye; oculars 2 (1)–3; temporals 1–3; chin shields about equal.

Light brown, anteriorly with six rows of small reddish or orange spots; belly brownish gray, base of ventrals dark; no markings on head; labials light; ventrals 177, subcaudals 87. Only one specimen known, from southern Arizona. Length 257 mm.

TROPIDONOTUS Kuhl.

Isis von Oken, 1826, 205; Boul. (part), *l. c.*, I, 192; *Natrix* Cope, *l. c.*, 667, and Rep. Nat. Mus., 957; *Nerodia* and *Regina* B. and G., *l. c.*, 38-45.

Maxillary teeth smooth, gradually increasing posteriorly, the last three or four rather abruptly enlarged; head scales normal; 1 loreal; 2 nasals; 2 internasals; body rather stout; head distinct; scales keeled with double pits in 17–33 rows; anal divided.

Hab.—Europe, Africa, Asia, Australia, America.

This genus much resembles *Eutœnia*, but has a divided anal and scale pits. Being viviparous, like *Eutœnia*, these snakes breed freely in captivity, and the insignificance of slight differences in color and pattern may be instructively observed in almost any single brood of young.

Key to the North American Species.

a.—Body with stripes; scales in 19–21 rows:
  *a*¹.—Preoculars 2:
    Brown; 3 black stripes on back; 4 on belly, 1. *T. leberis.*
    Olive brown, with 4 narrow stripes on back, 2. *T. grahami.*
    Brown, with 2 narrow stripes on back, 3. *T. rigida.*
  *b*¹.—Preocular 1:
    Yellowish brown; 4 dark brown stripes on back, 4. *T. clarki.*

b.—Body with spots or cross bands:
  *a*¹.—Scales in 19–21 rows; brown, with indistinct spots or cross-bands, ... 5. *T. compressicauda.*
  *b*¹.—Scales in 23–25 rows; brown with alternating spots or cross-bands, ... 6. *T. sipedon.*[13]
  *c*¹.—Scales in 27–29 rows:
    27 rows; large alternating spots, . 7. *T. rhombifer.*
    29 rows; narrow cross-bands; eye with circle of scales, 8. *T. cyclopeum.*
  *d*¹.—Scales in 29–33 rows; size large; alternating spots; parietals broken up, ... *T. taxispilotus.*

Tropidonotus leberis L.

Coluber leberis L., Syst. Nat., Ed. X, 216 (1758); *Regina leberis* B. and G., *l. c.*, 45; *Natrix leberis* Cope, *l. c.*, 668, and Rep. Nat. Mus., 993; *T. septemvittatus* Boul., *l. c.*, I, 239.

Size moderate; oculars 2–2; temporals 1–2; upper labials 7;

[13] *Tropidonotus bisectus* Cope (*Proc. U. S. Nat. Mus.*, 1887, p. 116) is obviously abnormal in some, at least, of its characters. Its locality is uncertain and is probably referable to some form of *T. sipedon.*

scales in 19 rows; ventrals 146–151; subcaudals 64–86. Dark brown above with three narrow longitudinal black stripes on the back; a yellow stripe on the two outer rows of scales; belly yellowish with four black stripes. Length 580 mm. (tail 154).

Hab.—United States east of the Mississippi; not common in Florida.

Tropidonotus grahami B. and G.

Regina Grahamii B. and G., *l. c.*, 47; *Natrix grahamii* Cope, *l. c.*, 668, and Rep. Nat. Mus., 991; *T. grahami* Boul., *l. c.*, I, 240.

Size moderate; oculars 2–2 (3); temporals 1–2; upper labials 7; scales in 19 rows (occ. 21); ventrals 150–173; subcaudals 45–65. A light brown or clay-colored dorsal stripe, one and a half scales wide, bordered by a narrow black line; below this, an olive-brown stripe three scales wide, bordered below by another black line on the fourth row; belly and three outer rows straw yellow. There is a narrow black line along the juncture between the ventrals and the outer scale row, and frequently another along the middle of the ventrals. In old individuals the colors darken and the appearance is sometimes presented of a brown snake with three narrow black stripes on each side. Length 880 mm. (tail 130).

Hab.—The Mississippi valley, from Michigan to Texas.

Tropidonotus rigidus Say.

Coluber rigidus Say, Jour. Acad. Phila., IV, 1825, 239; *Regina rigida* B. and G., *l. c.*, 49; *Natrix rigida* Cope, *l. c.*, 668, and Rep. Nat. Mus., 989; *T. rigidus* Boul., *l. c.*, I, 240.

Size rather small; oculars 2–2; temporals 1–2; upper labials 7; 19 rows of scales; ventrals 132–142; subcaudals 51–71.

Greenish brown, with two narrow black stripes on the back; labials and belly yellow, with two series of black spots on the ventrals, which sometimes merge into a clouded stripe in front and behind. Length 536 mm. (tail 102).

Hab.—Pennsylvania, south and southwest to the Gulf; rare in Florida.

Tropidonotus clarkii B. and G.

Regina Clarkii B. and G., *l. c.*, 48; *Natrix clarkii* Cope, *l. c.*, 669, and Rep. Nat. Mus., 987; *T. clarkii* Boul., *l. c.*, I, 238.

Size moderate; oculars 1–3 (2); temporals 1–3 (2); upper labials 8 (occ. 7); scales in 19 or 21 rows; ventrals 130–135; subcaudals 57–68.

Dark olive brown above, with three light olive stripes, the dorsal one three scales wide, and the lateral on the third, fourth and part of the fifth rows; belly yellow in the middle and light olive on the sides and outer row of scales; an irregular clouded stripe of reddish brown on each side of the median yellow tract. Length 806 mm. (tail 168).

Hab.—Western Louisiana and Texas.

Tropidonotus compressicaudus Kennicott.

Proc. Acad. Phila., 1860, 335.

Size moderate; tail somewhat compressed; scales in 19 or 21 rows, very occasionally 23; oculars 1–3 (2); temporals 1–3 (2); upper labials 8. The pattern in this species is not distinct, and is best seen in the young. The body color is greenish olive, with a dorsal row of black spots and a smaller series on each side. The spots are confused and irregular, the laterals being sometimes opposite the dorsals and sometimes alternating with them; they tend to fuse together, forming cross-bands, which when they alternate, are zigzag. The anterior spots in many specimens merge lengthwise into more or less distinct stripes on the neck, which at times extend some distance on the body. The belly is yellowish or ashy, commonly blotched with black, more heavily posteriorly; anteriorly each ventral is margined with black, leaving a transverse elliptical yellow mark in the centre, with sometimes a row of similarly colored small spots on each end. Top of the head greenish olive, often with an elongated black blotch on the frontal and parietals; labials yellow, more or less margined with black.

Two color forms may be distinguished :

Three rows of spots; traces of stripes on neck, 1. *T. c compressicaudus.*

Cross-bands on body; black stripes on neck, . . 2. *T. c. ustus.*

Tropidonotus compressicaudus compressicaudus Kenn.

Nerodia compressicauda Kenn., Proc. Acad. Phila., 1860, 335; *Natrix compressicauda* Cope, *l. c.*, 669, and Rep. Nat. Mus., 979; *T. compressicaudus* (part) Boul., *l. c.*, I, 238.

Grayish olive or ashy, with about forty dark spots on the back, distinct but irregular; the dorsal and lateral series mostly alternating, sometimes forming cross-bands in front. Indications of short stripes on the neck.

A small specimen collected by Mr. C. B. Moore, on Pine Island, Charlotte Harbor, has 133 ventrals; 74 subcaudals; length

255 mm. (tail 68). The species reaches a length of about 600 mm.

Hab.—Florida.

Tropidonotus compressicaudus ustus Cope.

T. ustus Cope, Proc. Acad. Phila., 1860, 340; *Natrix usta*, *N. compressicauda bivittata*, *N. c. walkerii*, *N. c. compsolæma* Cope, *l. c.*, 668, 669, 670, and Rep. Nat. Mus., 981–983; *N. c. tæniata* Cope, Am. Nat., 1895, 676; *T. compressicaudus* (part) Boul., *l. c.*, I, 238.

In this form the spots join to form more or less distinct cross-bands, some thirty-five to forty on the body; these are frequently obscure, especially in adults; the neck stripes occasionally extend some distance toward the tail. The body color is frequently pale yellow, more or less suffused with the reddish tinge common in many species of this genus. The whole pattern is indefinite and hardly any two specimens are alike; upon these trivial differences the forms given in the synonymy have been based.

Hab.—Florida.

Tropidonotus sipedon L.

Coluber sipedon L., Syst. Nat., Ed. X, 219 (1758).

Size moderate, to large and stout; scales in 23 or 25 rows; upper labials 8 (occ. 9); oculars 1–3 (2); temporals 1–3; ventrals 125–155; subcaudals 59–82.

In this species the color is brown, yellowish or red above, with darker transverse bands or spots on the back, or both in combination; the belly is yellowish, either spotted or unmarked. The pattern is distinct in the young, but the body color becomes dark in old specimens, until the markings are often wholly obliterated. Three well-marked color forms may be distinguished, of which *T. s. sipedon* is the common "water snake" of the Eastern Middle States; *T. s. fasciatus* of the Southern and Gulf States, and *T. s. transversus* seems to be restricted to the western part of the lower Mississippi valley.

a.—Ventrals spotted:
Cross-bands on whole of back, . . . 1. *T. s. fasciatus*.
Cross-bands in front; spots posteriorly, . 2. *T. s. sipedon*.
b.—Ventrals not spotted; whole body with alternating spots, 3. *T. s. transversus*.

Tropidonotus sipedon fasciatus L.

Coluber fasciatus L., Syst. Nat., Ed. XII, 378 (1766); *Nerodia fasciata* and *N. erythrogaster* B. and G., *l. c.*, 39, 40; *Natrix fasciata fasciata, N. f. pleuralis* and *N. f. erythrogaster* Cope, *l. c.*, 673, and Rep. Nat. Mus., 966, 973, 975; *N. f. pictieventris* Cope, Am. Nat., 1895, 677, and Rep. Nat. Mus., 969; *T. fasciatus* (part) Boul., *l. c.*, I, 242.

Size large; body stout; scales in 23 rows (rarely 25); upper labials 8; oculars 1–3 (2); temporals 1–3; ventrals 125–155; subcaudals 60–82.

Yellowish, yellowish red, or brown above, with from twenty to thirty darker transverse bands on the back, narrowing on the sides, and sometimes red spots on the sides; sometimes the bands are more or less broken posteriorly; belly whitish yellow or salmon color, blotched with yellow, red or black; very often each ventral is margined all around with the darker shade; top of the head uniformly dark, generally olive; an oblique dark streak behind the orbit; labials margined with dark brown. Old specimens become very dark. A large one from Georgia, now living in the Zoölogical Gardens, is sooty black with traces of red markings on the flanks; in this specimen the posterior third of the belly is almost wholly black. Another from Florida has the body color brick red on the back, becoming almost vermilion on the sides, the cross-bands being reddish with a mixture of olive; the ventrals are yellow or orange, mostly bordered all around with darker orange. This merely fortuitous phase is *pictieventris* Cope.[14]

A young specimen, now in the Academy's collection, bred in the Zoölogical Gardens from a typical *fasciatus*, shows at the age of one day, transverse bands, posteriorly much broken up into spots. With the darkening and consequent obscurity of color, especially along the dorsal area, which results from age, this specimen would develop the pattern attributed to *pleuralis* Cope.

I have no knowledge of small individuals of *erythrogaster* Shaw, and there is not the least doubt in my mind that this form is again the result of darkening with age of the red specimens of *fasciatus* described above; although it may be that some northern examples should be referred to *T. s. sipedon.*

The largest of this subspecies which I have seen, measured 1270 mm. (tail 300).

Hab.—Virginia to Florida and west to Texas.

[14] This identification is given on the authority of Prof. Cope, who declared that this specimen belonged to his new subspecies.

Tropidonotus sipedon sipedon L.

Coluber sipedon L., Syst. Nat., Ed. X, 219 (1758); *Nerodia sipedon* B. and G., *l. c.*, 38; *Natrix fasciata sipedon* Cope, *l. c.*, 671, and Rep. Nat. Mus., 969; *T. fasciatus* (part) Boul., *l. c.*, I, 242.

Size moderate; almost invariably 23 rows and 8 upper labials; old specimens sometimes much resemble some phases of *T. s. fasciatus*, but as a rule the body is less stout. When clear enough to be distinguished, the pattern consists of a series of large brown dorsal spots, separated by very narrow light interspaces; the dorsal alternates with a series of lateral spots separated by light intervals as long as or longer than themselves. Anteriorly, the lateral spots are often obscure or wanting. In old dark individuals, the general aspect is that of a dark-brown snake crossed on the middle of the back by narrow light lines, about half a scale wide, margined with black. The ventrals are spotted, but less heavily than in *fasciatus*. Top of the head brown; there is usually no post-ocular stripe, but when the general color is light, it is sometimes indicated. Ventrals 130–150; subcaudals 59–80. Length 890 mm. (tail 205).

Hab.—New England to the Carolinas; west to Wisconsin and Kansas.

Tropidonotus sipedon transversus Hallowell.

T. transversus Hallow., Proc. Acad. Phila., 1852, 177; *Nerodia Woodhousii* and *N. transversa* B. and G., *l. c.*, 42, 148; *N. f. transversa* Cope, *l. c.*, 672, and Rep. Nat. Mus., 973; *T. fasciatus* (part) Boul., *l. c.*, I, 242.

Size rather less than *T. s. sipedon;* scales in 23–25 rows; upper labials 8 or 9; temporals 1–3; ventrals 140–150; subcaudals 64–80. Body color olive or brown; a dorsal series of 30–35 dark brown spots about four scales long and seven or eight wide, black bordered in front and behind; the interspaces aoout one scale wide; an alternating series of upright rectangular dark brown blotches on the sides, the intervals being wider than the blotches; the dorsal and lateral series are not in contact; belly yellow, with the base of each ventral dusky. Top of head dark olive, with sometimes a yellowish elongated spot on the commissure of the parietals and two small yellow dots on the anterior border of the frontal. Length about 860 mm. (tail 186).

Hab.—Western Louisiana, Texas and Arkansas.

Tropidonotus rhombifer Hallowell.

Proc. Acad. Phila., 1852, 177; *Nerodia Holbrookii* and *N. rhombifer* B. and G., *l. c.*, 43 and 147; *Natrix rhombifera* Cope, *l. c.*, 673, and Rep. Nat. Mus., 963; *T. fasciatus* (part), Boul. *l.c.*, I, 242.

Size large; scales in 25 or 27 rows (Cope states that in thirteen individuals he found only one with 25 rows; whereas, in eight, I find five with 25, one with 26 and two with 27); oculars 1–2 (occasionally 3 or 4 post-oculars); temporals 1–2 (3); upper labials 8; ventrals 141–150; subcaudals 57–78.

Reddish brown, occasionally pale yellowish brown, darker on the back; a dorsal series of 35–40 black blotches, six or seven scales wide and two or three long, separated by rather longer interspaces; on each side an alternating series of vertical rectangular blotches, each of which is connected by a black oblique bar from its upper corners to the contiguous lower corners of the dorsal spots. Irregular cross bands on the tail. Belly yellow or gray, with an orange tinge posteriorly; a roundish black spot at the end of each ventral. Top of head olive brown; upper labials lighter olive; lower labials and throat yellow; all the labials narrowly margined with brown. This snake resembles *T. taxispilotus*, but has fewer scales and the spots are connected at the angles. Length 1,115 mm. (tail 220); probably reaches the size of *T. s. fasciatus*.

Hab.—Southern Illinois and Indiana to Texas; extends south to Vera Cruz.

Tropidonotus cyclopium Dum. and Bib.

Erp. Gen., VII, 576 (1854); Cope, *l. c.*, 673, and Rep. Nat. Mus., 961; Boul., *l. c.*, I, 244.

Size large; scales in 29 rows (occ. 31); oculars 1–2 (3); temporals 1–2 (3); upper labials 8 (7); almost always 2, 3 or 4 suboculars, forming with the pre- and post-oculars a ring around the eye; ventrals 135–150; subcaudals 64–81.

Greenish or dark olive; irregular, broken darker bands, about the width of one scale, across the back to about the seventh row, at intervals of about two scales; opposite the interspaces, on each side, a vertically elongated black blotch extending from the third to the sixth row; belly yellowish or greenish white, the exterior base of each ventral clouded with dusky, which increases posteriorly; top of head dark brown; lower half of upper labials lighter; all labials with dark margins. The whole pattern is obscure, and

in old examples is not easy to make out. Length 1,200 mm. (tail 260).

Hab.—Florida to New Orleans, and sparingly up the Mississippi to southern Illinois.

Tropidonotus taxispilotus Holbrook.

No. Am. Herp., IV, 35, Pl. 8 (1843); *Nerodia taxispilotus* B. and G., *l. c.*, 43; *Natrix taxispilota* Cope, *l. c.*, 674, and Rep. Nat. Mus., 959; *T. taxispilotus* Boul., *l. c.*, I, 245.

Largest of the American water snakes; body very stout; scales in 29–33 rows, strongly keeled; oculars 1–2 (3); temporals 2–4 (5); the parietal shields are small, their hinder portion being usually broken up into small plates; upper labials 8, usually only the fourth entering the eye: ventrals 130–148; subcaudals 70–90.

Reddish brown, with a dorsal and lateral series of rectangular blackish brown blotches, which alternate but do not touch; belly yellowish white with irregular blotches of dark brown. This species resembles both *T. s. transversus* and *T. rhombifer*, but may always be known from the former by the increased number of scale rows, and from the latter by the absence of the oblique bars connecting the dorsal and lateral spots. An occasional specimen shows the orbital ring of scales found in *T. cyclopium*. Length 1,300 mm. (tail 290).

Hab.—From the Potomac river to Florida and New Orleans.

SEMINATRIX Cope.

Am. Nat., 1895, 678, and Rep. Nat. Mus., 998; *Contia* (part) Cope, *l. c.*, 599; *Tropidonotus* (part) Boul., *l. c.*, I, 192.

Maxillary teeth smooth, slightly increasing posteriorly, the last two abruptly enlarged; body rather stout; head small and slightly distinct; head scales normal; one loreal; nasal half divided; no scale pits; scales smooth on body, sometimes faintly keeled on the tail.

Hab.—Florida.

Seminatrix pygæa Cope.

Contia pygæa Cope, Proc. Acad. Phila., 1871, 222, and *l. c.*, 600; *S. pygæus* Cope, Am. Nat., 1895, 678, and Rep. Nat. Mus., 998; *Tropidonotus pygæus* Boul., *l. c.*, I, 223.

Size small, tail short; 20–24 maxillary teeth, smooth and slightly increasing posteriorly, the last two abruptly enlarged; mandibular teeth about 20, subequal; head scales normal; internasals small;

oculars 1–2; temporals 1–2, the anterior elongated; upper labials variable (in six which I have examined three have 7, one has 7–8, one has 8 and one has 9); 17 rows of scales, smooth on the body, often faintly keeled on the tail; ventrals 118–130; subcaudals 32–54. Lustrous brownish black above, with a faint pale longitudinal line on each scale, most strongly marked on the sides; belly yellow or salmon color, each ventral with a small black bar on the exterior and outer margin. Length 484 mm. (tail 109); of another specimen 330 mm. (tail 50).

Hab.—Florida.

This species was included by Mr. Boulenger in his comprehensive genus *Tropidonotus*, but the smooth body scales and absence of scale pits, together with the wide difference in form and color pattern, appear to me to warrant generic separation. I have observed that in captivity these little snakes are fond of hiding under stones or bark in moist soil, and this habit is confirmed by Mr. Lœnnberg.[15] On the whole, I suspect that *pygœa* is a degenerating *Tropidonotus* in process of acquiring subterranean habits. It is possible that the light line on the dorsal scales may indicate the former presence of keels, but lately lost.

HELICOPS Wagler.

Syst. Amph., 170 (1830); *Liodytes* Cope, *l. c.*, 666; *Helicops* Boul., *l. c.*, I, 272.

Maxillary teeth smooth, posterior slightly longest, no interspace; one loreal; one internasal; two nasals; body rather stout; scales more or less keeled, usually without pits; anal divided.

Hab.—Florida, tropical America and Africa, southern Asia.

Helicops alleni Garman.

Proc. Boston Soc. Nat. Hist., 1874, 92; *Liodytes allenii* Cope, *l. c.*, 667, and Rep. Nat. Mus., 1013; *Helicops alleni* Boul., *l. c.*, I, 275.

Maxillary teeth 16–18, syncranterian; mandibular teeth 18–20, subequal; body short and stout; head slightly distinct; tail short; head scales normal, except that the internasal is single; oculars 1–3, the anterior occasionally extending upward to meet the frontal; temporals 1–2. In one specimen in my own collection the parietals extend to the labials, behind the post-oculars; upper labials 7 or 8; scales in 19 rows, smooth excepting on the tail, where a few rows are more or less distinctly keeled; as a rule scale

[15] *Proc. U. S. Nat. Mus.*, 1894, p. 323.

pits are absent, but in one specimen which I have examined they are irregularly present; ventrals 121–129; subcaudals 58–63.

A dark brown dorsal area six to eight scales wide, on each side of this a lighter olive stripe two rows wide, then a dark lateral stripe from the third to the fifth row; belly and labials yellow. Length 484 mm. (tail 110).

Hab.—Florida.

STORERIA B. and G.

Cat. No. Am. Serp., 135 (1853); Cope, *l. c.*, 674, and Rep. Nat. Mus., 1000; *Ischnognathus*[16] (part) Boul., *l. c.*, I, 285.

Maxillary teeth smooth, equal; no loreal; two nasals; two internasals; scales keeled without pits, in 15–17 rows; anal divided; size small; head distinct.

Hab.—North and Central America.

17 rows; 1 preocular; ventrals whitish, ... 1. *S. dekayi.*
15 rows; 2 preoculars; ventrals reddish, . 2. *S. occipitomaculata.*

Storeria dekayi Holbrook.

Tropidonotus dekayi Holb., No. Am. Herp., III, 53, Pl. XIV (1842); *S. dekayi* B. and G., *l. c.*, 135; Cope, *l. c.*, 675, and Rep. Nat. Mus., 1000; *Ischnognathus dekayi* Boul., *l. c.*, I, 286.

Head scales normal; no loreal; two nasals, nostril generally between them; oculars 1–2; temporals 1–1 (2); upper labials 7; scales in 17 rows, notched at the tip; ventrals 120–140; subcaudals 40–63. Length 350 mm. (tail 70).

Grayish to reddish brown or olive above, with a lighter dorsal stripe about three scales wide, bordered by a row of black dots or a black line, sometimes traces of a second and third alternating series on the sides; belly whitish, with black dots on the ends of the ventrals.

Hab.—North America and Mexico, east of the Rocky Mountains.

[16] There is possibly a question as to actual priority of publication between *Storeria* B. and G. and *Ischnognathus* Dum. and Bib., both bearing the date 1853; the paper of Dumeril and Bibron having been read before the Académie des Sciences, November 2, 1852, and the *Cat. of No. Am. Serpents* being accepted for publication in the same month. Both genera were established upon *S. dekayi*, but as the definition given by Baird and Girard is much more complete, usage warrants the retention of their name. Boulenger has much extended *Ischnognathus* and includes in it both *Clonophis kirtlandi* and *Tropidoclonium lineatum.*

Storeria occipitomaculata Storer.

Tropidonotus occipitomaculatus Storer, Rep. Rept. Mass., 230 (1839); *S. occipitomaculatus* B. and G., *l. c.*, 137; Cope, *l. c.*, 675, and Rep. Nat. Mus., 1003; *I. occipitomaculatus* Boul., *l. c.*, I, 287.

Head scutellation like *S. dekayi*, but there are two preoculars and five or six upper labials; the nostril is usually in the pre-nasal; 15 rows of scales. The size and proportions are similar. Color of the back much the same, but the vertebral stripe is less distinct and occasionally the outer row is lighter; belly salmon color in life with the ends of the ventrals clouded with darker; a light blotch on the vertex with a smaller one on each side of it, and a light spot on the posterior labials.

Hab.—North America, east of the Rocky Mountains.

CLONOPHIS Cope.

Proc. U. S. Nat. Mus., 1888, 391; *l. c.*, 674; *Tropidonotus* (part) Cope, Rep. Nat. Mus., 995; *Ischnognathus* (part) Boul., *l. c.*, I, 285.

Maxillary teeth smooth, equal; one loreal; one nasal; two internasals; size small, head not distinct; scales keeled; anal divided; head not distinct.

Hab.—North America.

Clonophis kirtlandi Kenn.

Regina kirtlandii Kenn., Proc. Acad. Phila., 1856, 95; *Clonophis kirtlandii* Cope., *l. c.*, 674; *Tropidonotus kirtlandii* Cope, Rep. Nat. Mus., 995; *Ischnognathus kirtlandi* Boul., *l. c.*, I, 286.

Head plates normal; 1 nasal, usually half divided; oculars 1–2; temporals 1–1 (2); upper labials 6; scales in 19 rows, all keeled; ventrals 123–133; subcaudals 50–59. Length 496 mm. (tail 115).

Brown above with a dorsal series of large dark spots and a small alternating series on the sides; belly yellowish or reddish, with a black spot at the end of each ventral; labials yellowish.

Hab.—Ohio to Michigan.

TROPIDOCLONIUM Cope.

Proc. Acad. Phila., 1860, 76; *l. c.*, 666, and Rep. Nat. Mus, 1011; *Ischnognathus* (part) Boul., *l. c.*, I, 285.

Maxillary teeth smooth, equal; one loreal; one nasal; two internasals; size rather small; head not distinct; scales keeled; anal entire. Resembles *Clonophis*, but has the anal single.

Hab.—North America.

Tropidoclonium lineatum Hallowell.

Microps lineatus Hall., Proc. Acad. Phila., 1856, 241; *T. lineatum* Cope, *l. c.*, 666, and Rep. Nat. Mus., 1011; *Ischnognathus lineatus* Boul., *l. c.*, I, 289.

Head plates normal; oculars 1–2; temporals 1–2 (1); upper labials 5 or 6; scales in 19 rows, the two outer only faintly keeled; ventrals 138–148; subcaudals 34–37. Length 350 mm. (tail 48).

Grayish brown with a light vertebral stripe, bordered by a row of black dots; a light lateral stripe on the second and third rows; belly light with two longitudinal series of black spots, more distinct posteriorly.

Hab.—Ohio to northern Texas.

AMPHIARDIS Cope.

Proc. U. S. Nat. Mus., 1888, 391; *l. c.*, 675, and Rep. Nat. Mus., 1008; Boul., *l. c.*, I, 290.

Maxillary teeth smooth, equal; one loreal; two nasals; two internasals; no preocular, the loreal extending to the eye; scales keeled; anal divided; size small; body rather stout; head not distinct; tail short.

Hab.—Texas.

Amphiardis inornatus Garman.

Virginia inornata Garm., No. Am. Rept., 97 (1883); *A. inornatus* Cope, *l. c.*, 675, and Rep. Nat. Mus., 1009; Boul., *l. c.*, I, 290.

Head scales normal; two internasals; two nasals; no preocular; loreal long, and with the prefrontals, entering the orbit; one postocular; upper labials 5; temporals 1–1; scales in 17 rows, lustrous, the outer only faintly keeled; ventrals 125–129; subcaudals 36. Length 260 mm. (tail 45).

Brownish olive above; belly white, base of ventrals dusky.

Hab.—Two specimens known, only from central Texas.

HALDEA B. and G.

l. c., 122; Cope, *l. c.*, 675, and Rep. Nat. Mus., 1009; Boul., *l. c.*, I, 290.

Maxillary teeth smooth, subequal; one loreal; two nasals; one internasal; no preocular; scales keeled without pits; anal divided; size small, body slender, head distinct, tail short.

Hab.—North America.

Haldea striatula L.

Coluber striatulus L., Syst. Nat., Ed. XII, 375 (1766); *Haldea striatula* B. and G., *l. c.*, 122; Cope, *l. c.*, 676, and Rep. Nat. Mus., 1009; Boul., *l. c.*, I, 291.

Only one internasal; head plates otherwise normal; loreal long and reaching the eye; no preocular; 1 post-ocular; temporals 1–1; upper labials 5; scales in 17 rows; ventrals 120–135; subcaudals 36–50. Length 250 mm. (tail 45).

Uniform reddish or grayish brown above; salmon color underneath; sometimes an indistinct light band across the parietals.

Hab.—Virginia to Minnesota and south to Texas.

SPILOTES Wagler.

Syst. Amph., 179 (1830); *Georgia* B. and G., *l. c.*, 92; *Spilotes* Cope, *l. c.*, 636; *Spilotes* and *Coluber* (part) Boul., *l. c.*, II, 23, 24; *Compsosoma* Cope, Rep. Nat. Mus., 857.

Maxillary teeth smooth, nearly equal; head scales normal; loreal sometimes absent; one preocular; scales smooth or keeled with two pits, sometimes in an even number of rows;[17] anal entire; size large; head moderately distinct; body sometimes compressed on the back.

Hab.—North and South America.

Spilotes corais Boie.

Coluber corais Boie, Isis, 1827, 537.

This large species ranges from the southern United States to Brazil; typical *corais* is South American, but there are several subspecies, one of which only, enters the United States.

Spilotes corais couperi Holbrook.

Coluber couperii Holb., No. Am. Herp., III, 75, Pl. 16 (1842); *Georgia Couperii* and *G. obsoleta* B. and G., *l. c.*, 92, 158; *S. c. couperii* Cope, *l. c.*, 637; *Coluber corais* (part) Boul., *l. c.*, II, 31; *Compsosoma corais couperii* Cope, Rep. Nat. Mus., 858.

Maxillary teeth 17–18, slightly enlarged posteriorly; mandibular teeth about 16, a little longer in front; internasals small; two nasals; loreal quadrangular; oculars 1–2; temporals 2–2; upper labials 8 (7), either the fifth or sixth small and triangular; scales smooth in 17 rows; ventrals 184–198; subcaudals 60–73.

Lustrous black above; belly slaty black; on the anterior ven-

[17] The restriction of this genus to snakes having the dorsal rows in even number does not appear to me justifiable. The type of *Spilotes* Wagler is *S. pullatus*, which species alone, Boulenger admits in the genus. It, however, has the scales frequently in an odd number; two specimens from Trinidad, formerly in the Zoölogical Garden, had 15 and 17 rows respectively (*Proc. Acad. Phila.*, 1893, 432).

trals dark red often appears, which usually shows plainly on the chin; upper labials light, with red or blackish margins. This species is one of the largest of North American snakes; in Florida it reaches about 1900 mm. (tail 350), and along the lower Rio Grande, in Texas, it exeeds those dimensions.

Hab.—Georgia and Florida to eastern Texas; northern Mexico.

COLUBER L.

Syst. Nat., Ed. X, 216 (1758); *Scotophis* B. and G., *l. c.*, 73; *Elaphis* (part) D. and B., *l. c.*, VII, 241; *Coluber* Cope, *l. c.*, 630, and Rep. Nat. Mus., 825; *Coluber* (part) Boul., *l. c.*, II, 24.

Maxillary teeth smooth, equal; one loreal; two nasals; two internasals; one preocular; two prefrontals; scales in 19–35 rows; generally more or less keeled, with two pits; anal divided; size moderately large; head distinct.

Hab.—Northern hemisphere.

Reliable specific characters, drawn from the scutellation, are wanting in the American species of *Coluber*. The proportions of the frontal and parietal plates, upon which some stress has been laid, are so variable with age and in individuals, that little importance can be attached to them singly; except that in *vulpinus*, and still more in *lindheimeri*, the anterior border of the frontal is wide and the lateral angles are obtuse, so that the plate is often subtriangular. Cope divides the species into sections, according to the number of anterior temporals, but I find them by no means constant enough to serve that purpose. The number of ventrals and subcaudals is not diagnostic, the limits of variability overlapping in most species; although *quadrivittatus*, a long-tailed species, has the largest number of subcaudals; and *vulpinus*, which is short and thick, has the least. There are fairly constant differences in pattern and color, and upon these, with a totality of other characters, they may be divided with some certainty.

Key to the American Species.

a.—Scales smooth, or 5 to 13 rows weakly keeled:

Light gray with brown spots, ... 1. *C. emoryi.*

Red with brick-red spots, ... 2. *C. guttatus.*

Yellow with four brown stripes, . . 3. *C quadrivittatus.*

b.—Scales with 9 to 21 rows more strongly keeled:

9–11 rows keeled; yellow with distinct spots, 4. *C. vulpinus.*

9–21 rows keeled; black above, or yellow with spots; lateral spots elongated, ... 5. *C. obsoletus.*

Coluber guttatus L.

Syst. Nat., Ed. XII, 386 (1766); *Scotophis guttatus* B. and G., *l. c.*, 78; *C. guttatus* and *C. g. sellatus* Cope, *l. c.*, 633, and Rep. Nat. Mus., 833, 836; *C. guttatus* (part) Boul., *l. c.*, II, 39.

Frontal a trifle longer than broad, rather broad behind, usually a little shorter than the snout; oculars 1–2; temporals 2–3 (4); upper labials 8, fourth and fifth entering the orbit; 11 or 12 lower labials, five touching anterior chin shields; scales usually in 27 rows (rarely 29), very slightly keeled on about five rows; ventrals 215–240; subcaudals 61–79. Length 1200 mm. (tail 190).

Light red, paler on the sides; dorsal blotches darker red with black borders and a narrow margin of dark red outside of the black; the dorsal spots reach to about the seventh row of scales; below these there is a second alternating series of smaller spots, which sometimes have a tendency to run together longitudinally, and a third series on the ends of the ventrals and the two outer rows. In some specimens the dorsal spots are wider, and the laterals are mostly absent or form an indistinct longitudinal stripe; this is *C. g. sellatus* Cope, the type specimens of which had 29 rows of scales, but a very similar specimen in my own collection from Lake Kerr, Florida, has but 27. The color beneath is yellowish white, with quadrangular blotches of black on the outer ends of the ventrals. The head is usually, but not always, banded above.

Hab.—Virginia to Florida and west to the Mississippi river.

Coluber quadrivittatus Holbrook.

No. Am. Herp., III, 89, Plate XX (1842); *Scotophis quadrivittatus* B. and G., *l. c.*, 80; *C. quadrivittatus* and *C. rosaceus* Cope, *l. c.*, 633, and Rep. Nat. Mus., 838, 837; *C. obsoletus* (part) Boul., *l. c.*, II, 51.

Frontal narrow behind, a little longer than broad in front; temporals 2–2 (3); upper labials 8, occasionally 9, and in one example 7 on one side, the fourth and fifth entering the eye; lower labials 11 to 13, four or five touching the anterior chin shields; 27 rows of scales, of which from five to thirteen are weakly keeled; ventrals 232–250; subcaudals 86–105 (one examined by me has the abnormally small number of 66).

Body color yellow or buff, sometimes faintly greenish, with four longitudinal stripes of dark brown; the laterals on the fourth and part of the third and fifth, and the upper ones on the eleventh and

part of the tenth and twelfth rows. In some specimens the body color is dark chestnut. Underneath and on top of head yellow, unmarked. The young in this species are spotted, the spots at subsequent stages fusing into stripes. One specimen 1720 mm. long, from Florida, now living in the Zoölogical Gardens, shows these spots quite plainly outlined on the back, forty-one in number from head to vent, with the stripes running across them. There are also faint remains of lateral spots. This mixture of immature and adult characters probably accounts for *C. rosaceus* Cope. Reaches a length of 1800 mm. (tail 300).

Hab.—North Carolina to Florida.

Coluber obsoletus Say.

Long's Exp. to Rocky Mts., I, 140 (1823).

Frontal about equals the length of snout, rather broad in front; anterior temporals usually 2, but occasionally 1 or 3; posterior temporals 3 (4); usually 8 upper labials, fourth and fifth in eye; 11 to 13 lower labials; scales in from 25 to 29 rows, from 9 to 21 of which are keeled; ventrals 224–258; subcaudals 75–86.

The color ranges from black above to gray or yellowish with dark spots; the lateral spots are more or less elongated; head not distinctly banded in adults. Size medium to large and stout.

Hab.—New England to the Gulf and west to the central plains.

Three good color forms may be distinguished:

Black above, sometimes with indistinct spots, . 1. *C. o. obsoletus.*
Yellowish with lead-colored spots; red on sides, 2. *C. o. lindheimeri.*
Gray or pale brown with brown spots, . . . 3. *C. o. confinis.*

Coluber obsoletus obsoletus Say.

l. c., 140; *Scotophis allegheniensis* B. and G., *l. c.*, 73; *C. obsoletus obsoletus* (part) Cope, *l. c.*, 635, and Rep. Nat. Mus., 844; *C. obsoletus* (part) Boul., *l. c.*, II, 50.

Frontal about equals or slightly exceeds the length of snout, rather broad behind; temporals 2–3; 8 upper labials, fourth and fifth in eye (one large specimen in the Academy's collection has 7, the third and fourth in eye; in this snake the prefrontals are only partially divided); lower labials 11, four or five touching the anterior chin shields; 27 or 25 rows of scales, nine to seventeen keeled (in adults usually fifteen or seventeen); ventrals 224–246; subcaudals 75–90.

Color black above, brownish in the young; the dorsal spots are indistinctly outlined, but not enough, as a rule, to make them out except in young or newly-shed individuals. In some specimens the skin on the sides is more or less red. The belly is usually slaty black behind, yellow anteriorly, more or less maculated with black blotches; throat and chin white; labials yellow, margined with black. A living specimen from Pennsylvania, 1080 mm. long, shows thirty indistinct dorsal spots, and has considerable red skin on the flanks, which shows between but does not invade the scales. Reaches a length of about 1850 mm. (tail 320).

Hab.—Massachusetts to Illinois and southwest to Texas; rare in Florida.

Coluber obsoletus lindheimeri B. and G.

Scotophis Lindheimerii B. and G., *l. c.*, 74; *C. o. obsoletus* (part) Cope, *l. c.*, 635, and Rep. Nat. Mus., 844; *C. obsoletus* (part) Boul., *l. c.*, II, 50.

Frontal about equal, or a trifle shorter than the snout; the anterior border about equals its length and the lateral angles are obtuse, so that the shape is subtriangular; temporals 2(3)–3 (4); 8 upper labials (in one case 9), fourth and fifth in eye; 12 to 14 lower labials, from four to six touching the anterior chin shields; scales in 27 or 29 rows (five have 27, three have 29, one has 31), from 11 to 21 keeled, never very strongly; ventrals 227–231; subcaudals 76–81.

Yellowish above with a dorsal series of dark lead-colored spots, five or six scales long and thirteen to fifteen wide, the interspaces of the body color are about two scales long and many of the scales have lead-colored centres; another series of elongated blotches on the third to the seventh row; ventrals with dark spots on the ends and outer scale rows, at intervals of several scales, otherwise yellowish white, often clouded posteriorly. The bases and margins of many scales in the light interspaces are rusty red in every living specimen that I have seen; this fades rapidly in alcohol. Top of head is uniform lead color without bands. The eye is rather large. Length 1525 mm. (tail 230).

Hab.—Texas.

The distinctness of the color pattern at all ages, the red on the scales of the flanks, the slight but, as it appears to me, very general difference in the shape of the frontal, with an apparently

circumscribed geographical range, are quite enough, in my opinion, to compel recognition of this subspecies.

Coluber obsoletus confinis B. and G.

Scotophis confinis and *S. lætus* B. and G., *l. c.*, 76, 77; *Elaphis spiloides* Dum. and Bib., *l. c.*, VII, 269; *Coluber confinis*, *C. spiloides* and *C. o. lemniscatus* Cope, *l. c.*, 632, 634, 635, and Rep. Nat. Mus., 829, 841, 849; *C. lætus* (part) Boul., *l. c.*, II, 49; *C. lætus* Cope, Rep. Nat. Mus., 850.

Frontal rather longer than wide, a little longer than the snout; temporals 2 (1)–3; upper labials 8, fourth and fifth in eye; five lower labials touching the anterior chin shields; scales in 27–25 rows, eleven or thirteen slightly keeled; ventrals 231–258; subcaudals 75–96.

Ashy or yellowish gray above, with dark brown dorsal spots narrowly margined with black, five or six scales long and thirteen to fifteen wide, longitudinally quadrate in shape; interspaces about two scales long; on the second to fifth rows the lateral spots are elongated, and exhibit sometimes a disposition to form an indistinct stripe; belly yellow, clouded posteriorly and with dark spots on the ends of the ventrals and the outer scale rows; a dark postocular stripe, some indistinct mottling on borders of the labials, but no distinct head bands in adults.

Hab.—From Virginia to Florida, west to Missouri and Texas.

I am not able to satisfy myself that *spiloides* Dum. and Bib. and *lætus* B. and G. are distinct from the present form; Cope, indeed, places them in three different sections of *Coluber*, assigning a different number of anterior temporals to each—one to *confinis*, two to *spiloides* and three to *lætus*. But the single specimen in his own collection, considered by him to be *confinis*, has two, which is the normal number; while the figures of *lætus* given by Baird in Marcy's *Report of the Red River Exp.*, Pl. VI, and *Pac. R. R. Survey*, Pl. XXX, fig. 53, both represent that species as also having two. (The three temporals in Cope's fig. 196 (p. 851) have every appearance of abnormality.) The difference in pattern stated in the description of *lætus* is probably accounted for by the youth of the type, which is but 460 mm. long, while the occurrence of 25 rows, as in *spiloides*, is quite normal, and 29, as in *lætus*, would not be startling in *C. o. confinis*.

Coluber emoryi B. and G.

Scotophis Emoryi B. and G., *l. c.*, 157; *C. emoryi* Cope, *l. c.*, 636, and Rep. Nat. Mus., 852; *C. guttatus* (part) Boul., *l. c.*, II, 39.

Frontal rather long, but little shorter than the snout; temporals 2 (3)–3 (4); upper labials 8, fourth and fifth in eye; lower labials 11, five touching the anterior chin shields; scales in 27 rows (occ. 29), all smooth or sometimes a few faintly keeled: ventrals 210–235; subcaudals 72–78.

Ground color rather pale gray, with a dorsal row of olivaceous brown blotches with black borders, three or four scales long and ten or twelve wide, separated by interspaces $1\frac{1}{2}$ to 2 scales long; a second series of smaller alternating spots from the third to the seventh rows, subcircular in shape; a third indistinct series on the second and third rows, and a fourth indicated on the outer row and the ends of the ventrals; belly yellowish or white with irregular ashy blotches posteriorly; top of head much banded, and a dark oblique post-ocular stripe. The number of dorsal spots varies greatly, those now living in the collection of the Zoölogical Society ranging from thirty-one to fifty in number on the body, and from seventeen to twenty-one on the tail. Length 1330 mm. (tail 190).

Hab.—Kansas to Texas; south to Chihuahua.

Coluber vulpinus B. and G.

Scotophis vulpinus B. and G., *l. c.*, 75; *C. vulpinus* Cope, *l. c.*, 632, and Rep. Nat. Mus., 831; Boul., *l. c.*, II, 49.

Frontal shorter than snout, with anterior border about equal to its length, and with obtuse lateral angles; temporals 2–3; upper labials 8, fourth and fifth in eye; lower labials 11, five touching anterior chin shields; 25–27 rows of scales, nine to eleven feebly keeled; ventrals 196–208; subcaudals 51–69; form stout.

Ground color light brown; dorsal spots dark brown and quadrate in shape, about four scales long and from eleven to thirteen wide; interspaces about two scales long. There are from 29–42 dorsal spots on the body, and 8–14 on the tail; there is a subcircular alternating series on the third to the seventh rows, and another of square blotches on the outer row and the ends of the ventrals; rest of the belly yellow, with dark blotches in the middle, usually involving two ventrals; anteriorly the belly is unmarked; no head bands in the adult, except the oblique post-ocular stripe; edges of labials slightly margined; eye small.

Length about 1450 mm. (tail 230). *C. vulpinus* is relatively stouter, and has a shorter tail than the other American species of *Coluber*.

Hab.—Illinois to Minnesota; south to Nebraska.

A snake belonging to this genus, collected at Fort Davis, Texas, having 9 upper labials; 27 rows of scales, of which six are slightly keeled; warm grayish ash color, with a series of narrow brown dorsal spots, eighty in number, and the lateral series indistinct, was described by Dr. Yarrow under the name of *Coluber bairdi* in Cope, *Bulletin U. S. Nat. Mus.*, No. 17, p. 41 (1880). The specimen remains unique and its relations are consequently doubtful.

RHINECHIS Michahelles.

Wagl., Icon. Amph., Pl. 25 (1833); Cope, *l. c.*, 637, and Rep. Nat. Mus., 862; *Coluber* (part) Boul., *l. c.*, II, 24.

Maxillary teeth smooth, equal; one loreal; one preocular; two internasals; two nasals; rostral entering between the internasals and projecting anteriorly; scales smooth, with two pits, in 27–31 rows; anal entire; size moderate; head small and slightly distinct.

Hab.—Southwestern United States and Mexico.

Rhinechis elegans Kenn.

Arizona elegans Kenn., U. S. and Mex. Bound. Surv. Rept., 18, Pl. XIII (1859); Van Den., *l. c.*, 193; *Rhinechis elegans* Cope, *l. c.*, 638, and Rep. Nat. Mus., 863; *Coluber arizonæ* Boul., *l. c.*, II, 66.

Body not very stout; head slightly distinct; snout projecting; rostral extending posteriorly between the internasals; two nasals; oculars 1 (2)–2; loreal long and narrow; temporals 2–3 (4); upper labials 8; scales in 27–31 rows; ventrals 207–227; subcaudals 45–59.

Brownish or reddish yellow above; a dorsal series of transverse brown spots, eight or nine scales wide, edged with darker brown, and two alternating series on each side, the upper one subcircular, the lower indistinct and on the three outer scale rows; belly white or yellowish without markings; a dark oblique streak behind the eye and indistinct bands or spots on the head; a few small spots on the anterior labials. The largest of two specimens from Pecos, Tex., now living in the Zoölogical Society's collection, measures 1100 mm. (tail 150). The dorsal interspaces are pink.

Hab.—Texas to southern California and northern Mexico.

PITYOPHIS Holbrook.

Pituophis Holb., No. Am. Herp., IV, 7 (1842); B. and G., *l. c.*, 64; Cope, *l. c.*, 638, and Rep. Nat. Mus., 865; *Coluber* (part) Boul., *l. c.*, II, 24.

Maxillary teeth smooth, equal; rostral extended behind; one loreal; one preocular with sometimes a small one beneath; two nasals; two internasals; four to six prefrontals; scales keeled with pits in 29–35 rows; anal entire; size large; head moderately distinct.

Hab.—North America and Mexico.

The species of *Pityophis* within the United States may be determined upon the following grounds: *P. melanoleucus*, from the eastern States, has a high rostral, in most cases reaching the prefrontals, and has large dorsal spots, 26–35 in number, on the body; usually about the four outer rows of scales are smooth.

P. sayi, from west of the Mississippi to the Rocky Mountains, has the rostral less high, usually reaching about two-thirds of the distance to the prefrontals, and has smaller spots, 40–60, on the body, and usually seven or eight smooth rows of scales.

P. catenifer, from the Pacific coast, west of the Sierra Nevada, has a low rostral, usually not penetrating between the internasals, and agrees generally in pattern with *sayi*.

These characters of the rostral and the dorsal spots are fairly constant, but examination of a considerable number of specimens from the region of the Great Basin leaves no doubt in my mind that the form found there intergrades with both *catenifer* and *sayi*, and reduces them to subspecies. The two species recognized here may in almost every case be distinguished by color characters alone:

Rostral high; no head bands; spots large and few,
1. *P. melanoleucus.*

Rostral lower; head bands distinct; spots small and many,
2. *P. catenifer.*

Pityophis catenifer Blainville.

Coluber catenifer Bl., Nouv. Ann. du Mus., IV, 290, Pl. 24, fig. 2 (1835).

In this species the rostral varies from low and broad to high and narrow above, penetrating sometimes between the internasals but not reaching the prefrontals; prefrontals usually four, but occa-

sionally six; preocular 1, with occasionally a small additional one below; three post-oculars; temporals 3–4 (5); upper labials 8 or 9; scales in 27–35 rows, from three to twelve outer rows smooth; the dorsal spots are quite small and range from 40–70 in number on the body; three series of more or less defined spots on the sides; the head is transversely banded between the orbits, from the orbit vertically downward on the labials, and obliquely from the post-oculars to the angle of the mouth; ventrals 205–243; subcaudals 50–72.

The three subspecies may usually be distinguished by the shape of the rostral:

Rostral low and broad, ... 1. *P. c. catenifer.*
Rostral higher, ... 2. *P. c. bellona.*
Rostral highest, ... 3. *P. c. sayi.*

Pityophis catenifer catenifer Blainville.

Coluber catenifer Bl., *l. c.*, 290; *Pituophis catenifer*, *P. Wilkesii* and *P. annectens* B. and G., *l. c.*, 69, 71, 72; *P. catenifer* Cope, *l. c.*, 641, and Rep. Nat. Mus., 876; *Coluber catenifer* (part) Boul., *l. c.*, II, 67; *P. catenifer* Van Den., *l. c.*, 195.

In this Pacific coast form the rostral is lowest of all and reaches, without penetrating, the internasals; upper labials 8 or 9; temporals 2 (3)–4; scales in 29–35 rows, none strongly keeled and from four to eleven smooth. Usually there are not more than five smooth rows, but a large specimen from Fort Tejon, Cal. (No. 3,800, Academy coll.), has eleven smooth on each side. Very little reliance can be placed, however, on the number of smooth rows in any of the species of *Pityophis*, as they not infrequently vary in different parts of the same individual. Ventrals 205–230; subcaudals 50–70.

Ground color yellowish or brownish; there are usually 50–70 dorsal spots on the body, but sometimes these are as few as 36, from 15–21 on the tail; anteriorly the spots are black, becoming brownish toward the tail; belly yellowish, with a series of dark spots on the ends of the ventrals and sometimes another ill-defined series on the middle; the head bands are distinct. Length 1,900 mm. (tail 315).

Hab.—Pacific coast west of the Sierra Nevada.

Pityophis catenifer bellona B. and G.

Churchillia bellona B. and G., Stans. Exp. Salt Lake, 350 (1852); *P. bellona* (part) B. and G., *l. c.*, 66, and Pac. R. R. Surv. Rept., Pl. XXIX, fig. 46; *P. sayi bellona* Cope, *l. c.*, 641, and Rep. Nat. Mus., 872; *Coluber catenifer* (part) and *C. melanoleucus* (part) Boul., *l. c.*, II, 67, 68; *P. catenifer deserticola* Stej., No. Am. Fauna, No. 7, Pt. II, 206.

This form appears to be found through the so-called Great Basin, from Arizona northward to Utah and Nevada. The rostral is almost always higher than in *P. c. catenifer*, but less so than in *P. c. sayi;* it commonly penetrates between the internasals about one-third of their length. No. 3,978 Academy collection, from Ogden, Utah, has the rostral barely touching the internasals, as in *P. c. catenifer*, and has a maximum of six rows of smooth scales. No. 3,782, from Owens' Valley, Cal., has the rostral penetrating further, fully one-third, and has three rows of smooth scales. No. 10,378, from Salt Lake, has the rostral as in No. 3,782. This specimen, 1,040 mm. long, was taken in 1899, and has sixty-four spots on the body, with seventeen on the tail; 31 rows of scales, of which four are smooth; the colors are very distinct, and on the posterior two-thirds of the body the light interspaces are pink. Mr. Stejneger (*l. c.*) has applied the name *deserticola* to this form, on the ground that *bellona* B. and G. is a synonym of *sayi*. It is probably true that the type of *bellona*—now lost—belonged to the plains form, but, as Prof. Cope points out, Baird's plate in the Pacific R. R. Survey represents the one now under consideration. In such a case, when there is a question as to absolute invalidity, I see no good reason for supplanting an old and well-known name by a new one. The intensity of color, including the pink tinge on the hinder half of the body, is hardly sufficient for subspecific distinction, for even if it should be constant—and some examples which have been four years in alcohol do not show it—it is of no great importance, and Florida specimens of *P. melanoleucus* would be quite as well entitled to separation on account of their rufous tints. The size of this form seems to be about as in *P. c. catenifer*.

Hab.—California east of the Sierra Nevada; Utah and Nevada south to Arizona and New Mexico.

Pityophis catenifer sayi Schlegel.

Coluber sayi Sch., Ess. Phys. Serp., II, 157 (1837); *Pituophis bellona* (part), *P. McClellanii* and *P. sayi* B. and G., *l. c.*, 66, 68, 151; *P. sayi sayi* Cope, *l. c.*, 641, and Rep. Nat. Mus., 870; *Coluber melanoleucus* (part) Boul., *l. c.*, II, 68.

The rostral is narrow above and penetrates the internasals about two-thirds of their length; an inferior preocular is frequently present; upper labials 8 or 9; scales in 27–33 rows, usually five to nine smooth; the dorsal spots are larger and usually fewer in number than in the other forms of *catenifer*, but an occasional specimen exhibits an equally large number. There are sometimes as few as forty, but two living specimens in my possession show respectively fifty-three and sixty-nine; ventrals 215–230; subcaudals 50–62.

The body color is yellowish or reddish brown; the spots are black anteriorly and more or less blackish brown posteriorly; the belly is yellowish, with a small dark blotch on the end of each alternate ventral; labials margined with dark brown; the head bands are usually distinct, but in two large specimens from Pecos, Tex., they are almost obsolete. The largest I have measured is 1,990 mm. (tail 190); greatest circumference 210 mm. This species doubtless reaches a length of over two metres.

Hab.—The range is very extensive: from Canada to Mexico, between the Mississippi river and the Rocky Mountains. It has also been taken in Illinois. No. 4,689 Academy collection, from Vernon, British Columbia, is not distinguishable from it; in fact, in this specimen the posterior extension of the rostral approaches *melanoleucus*.

Pityophis melanoleucus Daudin.

Coluber melanoleucus Daud., Hist., des Rept., VI, 409 (1803); *Pituophis melanoleucus* B. and G., *l. c.*, 65; Cope, *l. c.*, 640, and Rep. Nat. Mus., 867; *Coluber melanoleucus* (part) Boul., *l. c.*, II, 68.

In the eastern form the rostral reaches the extreme of elevation, in many cases completely separating the internasals and being in contact with the prefrontals; usually four prefrontals; oculars 1–3, sometimes a small sub-preocular; temporals small, 4 (3)–5; upper labials 8; scales in from 27–33 rows, usually 27 or 29, of which in most cases four to seven are smooth (in a large specimen from New Jersey there are seven smooth rows anteriorly and four on the hinder part of the body).

Body color whitish or buff, lighter on the sides. The dorsal spots are larger than in *catenifer*, and range from 25–35 on the body and 5–8 on the tail; they are blackish brown, more or less marked with paler brown on their centres; two or three series of rather indistinct spots on the sides; belly ivory white, with brown spots on the ends of the ventrals at intervals of about four scales. There are no distinct head bands in adults, though they are shown by the young. The top of the head is yellow, each plate more or less marked by pale brown; labials margined with brown. Of nearly one hundred Florida specimens which I have seen, all were uniformly tinged with rusty brown over the whole upper surface. Ventrals 210–230; subcaudals 52–65. The largest which I have measured was 1,837 mm. long (tail 185).

Hab.—New Jersey to Ohio, and south to the Gulf coast; most common along the seacoast.

ZAMENIS Wagler.

Syst. Amph., 188 (1830); *Bascanion* and *Masticophis* B. and G., *l. c.*, 93, 98; *Bascanium* Cope, *l. c.*, 621; *Zamenis* (part) Boul., *l. c.*, I, 379, and Cope, Rep. Nat. Mus., 787.

Maxillary teeth smooth, increasing gradually behind, with sometimes a slight interspace; one loreal; two preoculars, the lower very small; two nasals; two internasals; scales smooth or faintly keeled, with pits; anal divided; body long and slender; head distinct.

Hab.—Europe, Asia and North America.

The North American species (= *Bascanium* B. and G.) have a purely syncranterian dentition and smooth scales. The forms inhabiting the southern tier of states are puzzling in the extreme. To reach conclusions which shall at least have the merit of consistency, the changes which take place with growth in the best-known species from the eastern Gulf States, *Z. f. flagellum*, must be considered. Here the young are pale brownish with narrow, darker cross-bands on the whole upper surface; an occasional specimen also shows indistinct wider cross-bands anteriorly. The outer four or five rows of scales (rather more anteriorly) have pale edges, leaving a narrow dark line on the centre of each scale, giving the appearance of four or five narrow broken stripes on the sides. In eastern examples these markings usually disappear with age, although the cross-bands occasionally persist. From Texas westward there are forms in which the cross-bands have

become fixed, and others in which more or less of the lateral stripes have become likewise permanent, and even more distinct, although in these last the narrow cross-bands have disappeared in the young, which are striped. It must also be borne in mind that there is a marked inequality in the color intensity of all the American species, as there is a tendency for the color to remain pale on the hinder half of the body, involving the disappearance of the pattern. This is the case even in the uniformly colored species, as *Z. c. constrictor*, in which the change to the light colors of western specimens first shows on the tail, and *Z. f. piceus*, in which the bases of the scales posteriorly are pale.

The relative proportions in width of the hinder part of the frontal and supraocular plates are also growth characters and therefore irregular, and in my belief will bear only a small part of the weight which has been placed upon them.

Duly considering the various combinations in adults, of these early characters, I conclude that the *Z. flagellum* group extends from Florida to California, with two forms in addition to the typical one which demand recognition; these are *Z. f. piceus* and *Z. f. frenatus*. The striped forms, extending from Texas to California, have become differentiated to the point of wider separation, and seem to me to fall into two species: *Z. tæniatus* (with a subspecies *Z. t. ornatus*) and *Z. lateralis*. *Z. schotti* B. and G. and *Z. semilineatus* Cope, I can regard only as fortuitous examples of *tæniatus* and *lateralis* respectively.

This is almost a complete reversal of the views held by Prof. Cope, but the facts appear to me to indicate that the subspecies here admitted are tending in the direction of fixed characters, while those rejected are no more than instances of incomplete development.

Key to the Species.

A.—Adults not striped; 17 rows of scales:

7 upper labials; black, bluish, olive or green,
1. *Z. constrictor.*

8 upper labials; pale brown, or dark in front,
2. *Z. flagellum.*

B.—With stripes on the sides:

17 rows; brown with a narrow yellow stripe on third and fourth rows, ... 3. *Z. lateralis.*

15 rows; brown with 3–5 narrow dark stripes on sides,
4. *Z. tæniatus.*

Zamenis constrictor L.

Coluber constrictor L., Syst. Nat., Ed. X, 216 (1758).

Body slender with long tail; head scales normal; frontal rather more than half the width of supraoculars, behind; two nasals; one loreal; oculars 2–2; temporals 2–2 ; upper labials 7 (rarely 8); scales in 17 rows; ventrals 164–189; subcaudals 79–110.

Length 1,525 mm. (tail one-fourth to one-fifth).

Eastern specimens are black above and slate color beneath; west of the Mississippi they are usually green or olive above, yellow beneath. There are transitional stages between these extremes and they are good subspecies:

Size larger; black above, slate color beneath, 1. *Z. c. constrictor.*
Size smaller; green or olive above; yellow beneath,
2. *Z. c. flaviventris.*

Zamenis constrictor constrictor L.

l. c., 216; *Bascanion constrictor* B. and G., *l. c.*, 93; *B. constrictor* (part) Cope, *l. c.*, 623; *Zamenis constrictor* (part) Boul., *l. c.*, I, 387, and Cope, Rep. Nat. Mus., 791.

Examples from the east are lustrous black above; belly slate color; chin and throat white. One specimen from Pennsylvania now living in the Zoölogical Gardens presents the curious anomaly of a distinctly brown snout. In the western portion of its range it becomes bluish or olive black and the belly gets lighter. The young are unlike the adults, being gray, spotted or cross-banded with darker. Ventrals 175–189; subcaudals 83–110. The length of the largest I have seen was 1,470 mm. (tail 310).

Hab.—United States east of the central plains; northern Mexico.

Zamenis constrictor flaviventris Say.

Coluber flaviventris Say, Long's Exp., II, 185 (1823); *Bascanion flaviventris* and *B. vetustus* B. and G., *l. c.*, 96, 97; *B. constrictor* (part) Cope, *l. c.*, 623; *Zamenis constrictor* (part) Boul., *l. c.*, I, 337, and Cope, Rep. Nat. Mus., 791; *B. c. vetustum* Van Den., *l. c.*, 183; *Z. stejnegerianus* Cope, Rep. Nat. Mus., 797.

Size rather smaller and body more slender than in *B. c. constrictor;* the scutellation is similar, but an eighth labial is more frequently present; ventrals 164–188; subcaudals 79–95.

Length about 1,100 mm. (tail rather more than one-fourth). In examples from the plains the color is often bright green above and bright yellow underneath; chin and throat paler yellow; such specimens are usual in Kansas and Oklahoma. Westward and on

the Pacific coast the color darkens to olive, more or less yellowish green beneath.

I see no reason for regarding *Z. stejnegerianus* Cope as anything more than the present subspecies with eight labials. The subdivision of the loreal is so obviously abnormal that it is not worth considering. The type and only specimen came from southeastern Texas.

Hab.—United States west of the Mississippi river.

Zamenis flagellum Shaw.

Coluber flagellum Shaw, Gen. Zool., III, Pt. II, 475 (1802); Stej., Proc. U. S. Nat. Mus., 1894, 595.

This species has the scutellation of *Z. constrictor*, but the labials are 8; the frontal has half the width of the supraoculars behind; the muzzle is more elevated and the tail is longer; ventrals 184–210; subcaudals 80–112.

The young are cross-banded, and this pattern persists in some cases until they are grown.

Hab.—Southern United States from Florida to California.

There appear to be three color forms:

Pale brown; dark brown anteriorly, . . . 1. *Z. f. flagellum.*
Brown; narrow cross-bands in front, . . . 2. *Z. f. frenatum.*
Dark brown; pink beneath, ... 3. *Z. f. piceus.*

Zamenis flagellum flagellum Shaw.

l. c., 475; *Masticophis flagelliformis* and *Coluber testaceus* B. and G., *l. c.*, 98, 150; *B. flagelliforme* Cope, *l. c.*, 625; *Zamenis flagelliformis* (part) Boul., *l. c.*, I, 389; *Z. f. flagellum* (part) Cope, Rep. Nat Mus., 799.

Body slender with very long tail; the upper preocular very large; upper labials 8 (rarely 7); scales in 17 rows; ventrals 184–210; subcaudals 80–112.

Reaches an extreme length of 1,800 mm. (tail 385 to 430). In adults the head and anterior portion of the body is blackish brown, then dark brown back to the posterior half or third of the body, which is pale yellowish brown, each scale with a darker basal margin; belly yellowish posteriorly, black or brown under the dark anterior portion, somewhat spotted behind; sometimes each ventral is margined with brown; generally a light spot on the preoculars; chin and throat white, more or less spotted with brown.

The young have narrow cross-bands on the body which are sometimes retained to maturity. A Florida specimen 1,780 mm.

long, now living in the Zoölogical Gardens, shows these bands on the pale posterior portion of the body after shedding. Another, also from Florida, has indistinct wide cross-bands as in *Z. t. ornatus*.

Examples from west of the Mississippi are often of paler colors, with dark heads, and adults sometimes show the wide cross-bands and even indications of the light lateral stripes of *ornatus*.

I was formerly of the opinion that *testaceum* Say should be admitted as a pale desert form, but examination of a considerable number of living specimens from central Texas and westward, satisfy me that occasional individuals only, show its extreme paleness.

Hab.—South Carolina and Florida to Arizona; northern Mexico.

Zamenis flagellum frenatus Stej.

N. Am. Fauna, No. 7, 208 (1893); *Z. f. flagellum* (part) Cope, Rep. Nat. Mus., 802; *Z. flagelliformis* (part) Boul., *l. c.*, I, 389.

Mr. Stejneger has proposed to regard as a subspecies the form of *Z. flagellum* from Arizona and westward with permanent cross-bands on the anterior portion of the body. This is the retention of a juvenile character which was referred to under the preceding subspecies, and which would doubtless be more evident in eastern specimens, were it not for the dark color which pervades those parts in the adult; but there is so strong a disposition for this character to become permanent in the far west, that Mr. Stejneger is probably right in recognizing the form.

The following description is taken from a beautiful living specimen lately received from Yuma, Ariz., through the kindness of Mr. Herbert Brown:

17 rows of scales; 8 upper labials; ventrals 193; sub-caudals 100; length 1,400 mm. (tail 345). Body color rather pale brown extending to the ventrals; most of the scales are darker at the tip and faintly edged with pink; the lower edge of the outer row and the adjacent ends of the ventrals are whitish, forming an indistinct line, which is more obvious anteriorly and disappears before reaching the tail; the three or four outer rows are faintly darker in the centre, suggesting the dark lateral stripes of *Z. tæniatus*. The anterior fourth of the body is crossed by indistinct bands, one and a half to two scales wide; top of head rather darker brown, with a light spot on the pre- and post-oculars;

indications of a light line from the nostril to the eye; upper labials yellow on the lower margin, more broadly behind; belly yellowish, much clouded with pink, which tends to form longitudinal stripes in front; throat and chin yellow, spotted with dark brown.

Hab.—Arizona, Nevada, Utah and southern California.

Zamenis flagellum piceus Cope.

Bascanium piceum Cope, *l. c.*, 625; *Z. flagelliformis* (part) Boul., *l. c.*, I. 389; *B. f. piceus* Cope, Rep. Nat. Mus., 804; *B. piceum* Stej., No. Am. Fauna, No. 7, 209.

The type specimen, from Camp Grant, Arizona, has 19 rows of scales; 17 is probably the usual number, as Mr. Stejneger mentions one with that number, which agrees with a living example received at the Zoölogical Gardens in 1894 from Tucson; this specimen had 8 upper labials on one side and 9 on the other. The color in life was a rich dark brown with a purplish tinge, posteriorly most of the scales were light brown at the base; the belly was pink slightly spotted with dusky, which increased anteriorly until the throat was nearly black; there was a little pink on the preoculars and lower labials; rest of head very dark. The pink rapidly faded to yellow in alcohol. This specimen is now in the Academy's collection. Ventrals 196; subcaudals 108; length 1,650 mm. (tail 380). Cope's specimen measured 1,263 mm. and the tail was proportionately longer (355 mm).

Hab.– The three specimens known are from southern Arizona.

Zamenis lateralis Hallowell.

Leptophis lateralis Hall., Proc. Acad. Phila. 1853, 237; *Bascanium laterale laterale* Cope, *l. c.*, 628; *Zamenis tæniatus* (part) Boul., *l. c.*, I, 300; *B. laterale* Van Den., *l. c.*, 188; *Z. lateralis lateralis* and *Z. semilineatus* Cope, Rep. Nat. Mus., 808, 805.

Scales in 17 rows; upper labials 8; tail between one-third and one-fourth of the length; ventrals 190–199; subcaudals 105–123. Length about 1,500 mm.

Brown above with a narrow yellow stripe on the third and fourth rows, sometimes extending to the tail and often narrowly bordered with black; belly yellow with a few dark spots under the throat and chin; no spots on top of head; a more or less distinct light spot on the temporals and a light line from the nostril to the eye; labials light, a little spotted.

Hab.—Arizona and southern California.

Zamenis tæniatus Hallowell.

Proc. Acad. Phila., 1852, 181.

This species is characterized by the presence of 15 rows of scales, 8 upper labials, and longitudinal stripes on the sides; frontal about half the width of supraoculars posteriorly; tail very long; ventrals 188–210; subcaudals 120–157. The young are striped.

Hab.—Western Texas to California.

Pale brown; often wide cross-bands; two pale lateral stripes,
1. *Z. t. ornatus.*

Dark brown; no cross-bands; 3 or 4 narrow dark lateral stripes,
2. *Z. t. tæniatus.*

Zamenis tæniatus ornatus B. and G.

Masticophis ornatus B. and G., *l. c.*, 102, 159; *Bascanium tæniatum* subs. *ornatum* Cope, Bull. U. S. Nat. Mus., I, 40; *B. ornatum* Cope, *l. c.*, 629; *Zamenis tæniatus* (part) Boul., *l. c.*, I, 390; *Z. ornatus* Cope, Rep. Nat. Mus., 813.

Scales usually in 15 rows (No. 5,362 Academy coll., from Arizona, has 17); ventrals 200–206; subcaudals 130–152.

Length about 1,700 mm. (tail 565).

Pale brown above, with more or less distinct wide cross-bands of purplish brown on the back; the whole upper surface is sometimes suffused with the darker color, in which case the cross-bands are obscure or absent; a yellowish longitudinal line on the outer row and the edge of the ventrals, and another on the third and fourth rows; the upper one is edged with black and sometimes there is a faint dark line through the middle of it; belly yellow, more or less blotched.

Hab.—Western Texas.

Zamenis tæniatus tæniatus Hallowell.

Leptophis tæniatus Hall., Proc. Acad. Phila., 1852, 181; *Masticophis tæniatus* and *M. Schotti* B. and G., *l. c.*, 103, 160; *B. tæniatum* and *B. Schotti* Cope, *l. c.*, 629; *Zamenis tæniatus* (part) Boul., *l. c.*, I, 390; *B. tæniatus* Van Den., *l. c.*, 190; *Z. schottii* and *Z. tæniatus* Cope, Rep. Nat. Mus., 811, 815.

Snout and muzzle rather long and narrow; body slender and tail very long; scales in 15 rows (very rarely 17); upper labials 8; temporals 2–2; ventrals 188–209; subcaudals 120–157.

Length about 1,300 mm. (tail 370).

Yellowish brown to dark brown, the outer four or five rows lighter, each having a narrow black line running on the centre, and

usually another on the edge of the ventrals; most of the scales on the rest of the dorsal region have dark centres; yellowish beneath, without spots except sometimes on the throat; top of head dark: an indistinct light line from the nostril to the eye; a light spot on both pre- and post-oculars; labials yellow, a little spotted.

I am unable to formulate a valid distinction between *Z. schotti* B. and G. and this species; the stripes appear not to run as far back, but they are variable in this respect in *Z. t. tæniatus*, and their disappearance on the tail is doubtless a result of the fading out of color (or, more correctly, the failure to develop it) posteriorly, which is common in the genus. No. 5,369 Academy coll. (old number 1,973), labeled *schotti*, from the Rio Grande, appears to be one of Schott's original specimens, and almost exactly corresponds to No. 5,363, a *tæniatus* from Utah, of about the same date. But it must be admitted that no great reliance can be placed upon color characters in specimens which have been for so many years in spirits.

Hab.—Arizona, Utah and southern California.

SALVADORA B. and G.

l. c., 104; Cope, *l. c.*, 618, and Rep. Nat. Mus., 817; *Zamenis* (part) Boul., *l. c.*, I, 379.

Maxillary teeth smooth, increasing posteriorly, no interspace; rostral widened laterally with projecting edges; one loreal; two internasals; two nasals; two or three preoculars; pupil round; scales smooth with pits in 17 rows; anal divided; size medium; body slender; head distinct.

Hab.—Southwestern United States; Mexico.

This genus is like *Zamenis*, but has the rostral considerably enlarged, with free, expanded lateral borders.

Salvadora grahami B. and G.

l. c., 104; Cope, *l. c.*, 619, and Rep. Nat. Mus., 818; *Zamenis grahami* Boul., *l* c., I, 393; *S. grahami* Van Den., *l. c.*, 180; *Phimothyra hexalepis* Cope, Proc. Acad. Phila., 1861, 300; *S. g. hexalepis* Stej., No. Amer. Fauna, No. 7, 205.

Head plates normal; rostral entering between internasals; lower preocular small, sometimes a third preocular; post-oculars 2 or 3; temporals 1 (2)–2 (3); upper labials 8; scales in 17 rows; ventrals 175–206; subcaudals 75–108.

Length about 1,200 mm. (tail 300).

A yellowish dorsal stripe about three scales wide, narrowing

toward the tail; on each side a brown or olive stripe about the same width, bordered below by a greenish olive or brown stripe extending to the ventrals; the stripes are sometimes indistinct and at others are broken into spots; belly yellowish; head brown, usually unmarked.

Hab.—Western Texas to Utah and Arizona; Sonora and Lower California.

Several other species of *Salvadora* are found in Mexico.

PHYLLORHYNCHUS Stej.

Proc. U. S. Nat. Mus., 1890, 151; Cope, *l. c.*, 617, and Rep. Nat. Mus., 821; *Lytorhynchus* (part) Boul., *l c.*, I, 414.

Maxillary teeth smooth, longer behind, an interspace; rostral prominent with projecting lateral edges, and separating the internasals; two to four loreals; three preoculars; small scales between the eye and the labials; two nasals; two internasals; pupil vertical; one pair of chin shields; scales smooth or partly keeled, without pits, in 19 rows; anal entire; size medium; head slightly distinct.

Hab.—North America and Mexico.

Phyllorhynchus browni Stej.

l. c., 152; Cope, *l. c.*, 618, and Rep. Nat. Mus., 821; *Lytorhynchus browni* Boul., *l. c.*, I, 417.

Body slender; rostral very large, projecting, with free edges and completely separating the internasals; a transversely enlarged shield behind the parietals; loreals 3, the upper and lower small; oculars 3–4; several suboculars separating the eye from the labials; upper labials 6; temporals 3; one pair of chin shields; scales in 19 rows, nearly smooth anteriorly, keeled behind; ventrals 159; subcaudals 31.

Length 325 mm. (tail 42).

Whitish, with 15 brown blotches, mostly subquadrangular and lighter in the centre; belly white; a dark bar across the head between the eyes.

Hab.—Only two specimens known, from Tucson, Arizona.

Phyllorhynchus decurtatus Cope.

Phimothyra decurtata Cope, Proc. Acad. Phila., 1868, 310; *Phyllorhynchus decurtatus* Stej., Proc. U. S. Nat. Mus., 1890, 154, and Cope, Rep. Nat. Mus., 823; *Lytorhynchus decurtatus* Boul., *l. c.*, I, 417.

Much like *P. browni*, but the scales are smooth; there is no

enlarged shield behind the parietals; the tail is shorter; the dorsal spots are more numerous and there are two series of irregular lateral spots. The type specimen in the Academy's collection is from northern Lower California, and there is a second in the National Museum from La Paz. A third, which has just reached me from Mr. Herbert Brown, collected by him at Yuma, Ariz., for the first time establishes the species within the United States. This specimen differs from the type in that the rostral penetrates between the prefrontals as in *P. browni;* there is but one subocular, and but two post-oculars on one side; there are four temporals; the tail is rather longer, and the spots are more numerous, being forty-one on the body and six on the tail (thirty-two altogether in the type). Ventrals 183; subcaudals 30. Length 403 mm. (tail 40).

Hab.—Lower California; Yuma, Arizona.

CYCLOPHIS Günther.

Cat. Col. Snakes, Br. Mus., Günth., 119 (1858); Cope, *l. c.*, 621; *Leptophis* B. and G., *l. c.*, 106; *Contia* (part) Boul., *l. c.*, II, 255.

Maxillary teeth smooth, equal; one loreal; one preocular; two internasals; one nasal; scales keeled with two pits; anal divided; size small, tail long; head distinct; color green.

Hab.—Asia; North America.

Cyclophis æstivus L.

Coluber æstivus L., Syst. Nat., Ed. XII, 387 (1766); *Leptophis æstivus* and *majalis* B and G., *l. c.*, 106; *Cyclophis æstivus* Cope, *l. c.*, 621, and Rep. Nat. Mus., 784; *Contia æstiva* Boul., *l. c.*, II, 258.

Head scales normal; loreal rather long, occasionally absent; oculars 1–2 (of two examples from New Jersey in my collection, one has a subpreocular on each side, and the other has three post-oculars on one side); temporals 1–2; upper labials 7, the third and fourth in orbit (one from Florida has the fourth and fifth in the orbit on one side); ventrals 148–166; subcaudals 111–148; scales in 17 rows, the outer smooth. Length 920 mm. (tail 330).

Uniform bright green above; labials and belly yellowish white or bright yellow.

Hab.—New Jersey to Florida, west to the Mississippi, southwest to New Mexico.

LIOPELTIS Cope.

Proc. Acad. Phila., 1860, 559; *Chlorosoma* B. and G., *l. c.*, 108; *Liopeltis* Cope, *l. c.*, 620, and Rep. Nat. Mus., 781; *Contia* (part) Boul., *l. c.*, II, 255.

Maxillary teeth smooth, equal; head scales normal; a loreal, occasionally absent; one nasal; scales smooth, with one pit; anal divided; size small; tail long; head distinct.

Hab.—Eastern Asia; North America.

Liopeltis vernalis Harlan.

Coluber vernalis Harl., Jour. Acad. Phila., V, 1827, p. 361; *Chlorosoma vernalis* B. and G., *l. c.*, 108; *L. vernalis* Cope, *l. c.*, 620, and Rep. Nat. Mus., 782; *Contia vernalis* Boul., *l. c.*, II, 258.

Head scales normal; loreal nearly square, sometimes fused with the nasal; one nasal; oculars 1 (2)–2; temporals 1–2; upper labials 7, third and fourth in orbit; lower labials 8; scales smooth in 15 rows; ventrals 120–138; subcaudals 69–94.

Uniform bright green above; labials and belly yellowish green. Length 500 mm. (tail 150).

Hab.—Canada and United States east of Rocky Mountains; rare in the southeastern States.

CONTIA B. and G.

l. c., 110; Cope (part), *l. c.*, 599, and *Chionactis* Cope, *l. c.*, 604, and Rep. Nat. Mus., 925, 935[18]; *Contia* (part) Boul., *l. c.*, II, 255; *? Lodia* B. and G., *l. c.*, 116.

Maxillary teeth smooth, equal; one loreal; one preocular; one nasal, sometimes half divided below the nostril; two internasals; scales smooth, without pits in 15–17 rows; anal divided; size small; head not very distinct.

Hab.—North America; Asia.

Key to the American Species.

a.—13 rows of scales; pale brown, no cross-bars, . 1. *C. taylori.*
b.—15 rows of scales:
Reddish or greenish brown; sometimes cross-bands, 2. *C. episcopa.*
White, with bands or rings around body, 3. *C. occipitale.*
Brown, with a light band on each side, . . 4. *C. mitis.*

[18] Prof. Cope removes all the species included here in *Contia*, except *C. mitis*, to *Chionactis* Cope, on account of their possession of a shallow external groove on the posterior maxillary tooth. This is probably the same noted by Dr. Günther as a distinct elongated pit at the base of the hinder teeth in large specimens of the Mexican *Conopsis nasus* (Biologia Centrali Americana, Rept., p. 97). Sufficient material is not accessible to determine either the constancy or the value of this character, and it seems best for the present to retain these snakes in the genus *Contia*.

Contia taylori Boulenger.

l. c., II, 265, Pl. XII, fig. 3 ; Cope, Rep. Nat. Mus., 936.

Nasal not divided; one loreal, longer than deep; oculars 1–2; temporals 1–1 (2); upper labials 7; posterior chin shields very small; scales in 13 rows; ventrals 126–137; subcaudals 37–46; length 270 mm. (tail 55).

" Pale brown above, each scale darkest along the centre; upper lip and lower parts white."

Hab.—Duval county, Texas; northern Mexico (three specimens known).

Contia episcopa Kennicott.

Lamprosoma episcopum Kenn., U. S. Mex. Bound. Surv., p. 22, pl 8, fig. 2 (1859).

This species has the scales in 15 rows; an undivided nasal; an elongated loreal; 7 upper labials; oculars 1–2; temporals 1–2 (1); ventrals 143–167; subcaudals 35–57; tail about one-fourth of the length. Ranges from Texas to Utah, Arizona and northern Mexico.

Rosy yellow to ashy; no cross-bands, . . . 1. *C. e. episcopa.*
Orange, with black cross-bands, ... 2. *C. e. isozona.*

Contia episcopa episcopa Kennicott.

l. c., 22 ; *C. e. episcopa* and *C. e. torquata* Cope, *l. c.*, 601; *C. episcopa* and *C. torquata* Boul., *l. c.*, II, 265, 266 ; *Chionactis episcopa episcopa* and *C. e. torquata* Cope, Rep. Nat. Mus., 938, 939.

Ventrals 143–163; subcaudals 35–57. Length about 250 mm.

Yellowish, reddish or greenish brown, sometimes with a yellow dorsal stripe three scales wide; most of the scales tipped with light brown; top of head like the body, or brown or black; belly yellowish or greenish white.

C. e. torquata Cope rests upon degrees of color intensity which are admittedly inconstant in the two specimens known.

Hab.—Texas and northern Mexico.

Contia episcopa isozona Cope.

Proc. Acad. Phila., 1866, 304, and *l. c.*, 601 ; *C. isozona* Boul., *l. c.*, II, 266.

Ventrals 158–167; subcaudals 50–52; orange or red with black cross-bands which almost reach the ventrals, becoming complete rings on the tail; belly whitish; snout red, rest of head black. Length about 250 mm.

Hab.—Texas to Arizona and Utah; Sonora.

Contia occipitale Hallowell.

Rhinostoma occipitale Hall., Proc. Acad. Phila.; 1854, 95; *Chionactis occipitalis* Cope, *l. c.*, 605, and Rep. Nat. Mus., 941; *Contia occipitale* Boul., *l. c.*, II, 266.

Snout prominent; nasal undivided; loreal small; oculars 1–2; temporals 1–2; upper labials 7; scales in 15 rows; tail about one-fifth of total length; ventrals 147–158; subcaudals 34–44.

Length about 300 mm.

Color white or pale yellow, sometimes pinkish; narrow black rings around the body at intervals of about five scales, sometimes interrupted on the ventrals; rest of belly whitish; a black crescent on the hinder part of parietals with the horns forward.

Hab.—Arizona.

Contia mitis B. and G.

l. c., 110; ? *Lodia tenuis* B. and G., *l. c.*, 116; *C. mitis* and *L. tenuis* Cope, *l. c.*, 601; *Contia mitis* Boul., *l. c.*, II, 267, and Van Den., *l. c.*, 163.

Size small; tail very short; oculars 1–1 (2); upper labials 7; temporals 1–2; scales in 15 rows; ventrals 147–186; subcaudals 30–52; length 322 mm. (tail 40). Reaches a length of 415 mm.

Dark brown with a yellowish stripe on the fourth row of scales, and a row of black dots below it; ventrals yellowish edged with black; a black streak on each side of head; chin and throat spotted with black.

Lodia tenuis B. and G., was based upon one example from Puget Sound, Oregon, agreeing with *C. mitis* except in having a small additional plate between the prefrontals, and the loreal reaching the eye under the preocular. As no further specimen has come to light in fifty years, it seems safe to refer this unique example to the class of anomalies, the head plates being usually variable in these small burrowing forms.

Hab.—Central California to Washington and Oregon.

DIADOPHIS B. and G.

l. c., 112; Cope, *l. c.*, 614, and Rep. Nat. Mus., 743; *Coronella* (part) Boul., *l. c.*, II, 188.

Maxillary teeth smooth, subequal; one loreal; two preoculars; two internasals; two nasals; scales smooth with one pit, in 15–17 rows; anal divided; size small; head distinct.

Hab.—North America; Mexico.

If due attention be paid to juvenile characters, the North

American species of *Diadophis* must be limited to three. Baird and Girard established two others, which with a third of his own making, Cope regards as subspecies of *D. amabilis*. In these forms the chief differences are in the shape of the frontal and supraocular plates, and in the extent to which the dark dorsal area invades the two outer rows of scales. But a series of the eastern form, *D. punctatus*, of all sizes, shows that exactly these differences, in that species, are age characters, and in a genus whose included forms are so nearly similar, there can be little doubt that they are so in *amabilis* as well.

Key to the Species.

17 rows of scales; 7 (8) upper labials; ventrals 237 or less, 1. *D. regalis.*

15 rows of scales; 7 (8) upper labials; ventrals 210 or less, 2. *D. amabilis.*

15 rows of scales; 8 (7) upper labials; ventrals 160 or less, 3 *D. punctatus.*

Diadophis punctatus L.

Coluber punctatus L., Syst. Nat., Ed. XII, 376; *D. punctatus* B. and G., *l. c.*, 112; *D. punctatus* and *D. amabilis stictogenys* (part) Cope, *l. c.*, 616, 617, and Rep. Nat. Mus., 751, 750; *Coronella punctata* Boul., *l. c.*, II, 206.

Head not very distinct; head plates normal; in adults the frontal is much narrowed behind and acute; oculars 2 (1)–2; temporals 1–1; upper labials 8 (occ. 7); scales in 15 rows; ventrals 136–160; subcaudals 36–62. Length 355 mm. (tail 65).

In adults the color is bluish black or brownish above, covering the whole of the dorsal scales and extending like a bar upon the end of each ventral; the belly is yellow or orange, sometimes with a series of transverse dark blotches in the middle of each ventral, these are, however, often absent; there is usually a yellow half-collar on the nape, half a scale to a full scale in width; the lower half of the upper and the whole of the lower labials is yellow with small spots of black. In the young, the back is bright reddish brown or salmon color, which reaches only the upper border of the second row of scales, and extends downward as the color deepens; the top of the head is dark brown and the nuchal collar is bordered behind by a band of the same dark color; the frontal plate is also more angular in front and less tapering behind, than in the adult.

Hab.—North America, east of the Mississippi river.

Diadophis amabilis B. and G.

l. c., 113; *D. docilis* and *D. pulchellus* B. and G., *l. c.*, 114, 115; *D. a. amabilis*, *D. a. pulchellus*, *D. a. docilis* and *D. a. stictogenys* (part) Cope, *l. c.*, 616, and Rep. Nat. Mus., 747–750; *Coronella amabilis* Boul., *l. c.*, II, 207; *D. amabilis* Van Den., *l. c.*, 164.

In this species the frontal is broader behind than in either of the others; upper labials 7 (occ. 8); temporals 1–1 (2); scales in 15 rows; the form is more elongate than in *punctatus*, the ventrals ranging from 182–210; subcaudals 53–63. Length 470 mm. (tail 80).

The coloration is much as in *punctatus;* the spots on the ventrals are small and irregular, and the nuchal half-collar is almost always present.

Hab.—Texas to the Pacific coast; south to Sonora.

Diadophis regalis B. and G.

l. c., 115; *D. regalis regalis* and *D. r. arnyi* Cope, *l. c.*, 615, and Rep. Nat. Mus., 744, 745; *Coronella regalis* Boul., *l. c.*, II, 208.

The frontal is narrow behind, as in *punctatus;* scales in 17 rows; upper labials 7 (occ. 8); temporals 1–1 (2); ventrals 183–237; subcaudals 56–75. Length 570 mm. (tail 100); being the largest of the genus.

Ashy to brownish black; belly yellow or reddish with small black spots; the nuchal collar is generally absent.

Hab.—Illinois to Arizona; south to Vera Cruz.

OPHIBOLUS B. and G.

l. c., 82; Cope, *l. c.*, 607; *Osceola* B. and G., *l. c.*, 133 and Cope, *l. c.*, 606; *Coronella* (part) Boul., *l. c.*, II, 188; *Osceola and Ophibolus* Cope, Rep. Nat. Mus., 881, 902.[19]

Maxillary teeth smooth, slightly increasing posteriorly, no interspace; one loreal; one preocular; two internasals; two nasals; scales smooth, with two pits, in 19–25 rows; anal entire; size large and stout to small and slender; head slightly distinct.

Hab.—North America and Mexico.

Key to the Species.

a.—Scales in 21 rows; dorsal spots brown or red with black borders; or rings around body, ... 1. *O. doliatus.*

[19] *Lampropeltis* Fitzinger, lately exhumed, is regarded as a *nomen nudum* for the reasons given under *Eutænia.*

b.—Scales in 21–23 rows:

Size large; black, with centres of scales white or yellow; or cross-bands of same color, ... 2. *O. getulus.*

Size small; yellow and black rings; black rings more or less divided by red, ... 3. *O. zonatus.*

Size medium; pale brown; dorsal spots much wider than long; no head bands, . . . 4. *O. rhombomaculatus.*

c.—Scales in 25 rows; size medium; grayish brown, head bands distinct, ... 5. *O. calligaster.*

Ophibolus doliatus L.

Coluber doliatus L., Syst. Nat., Ed. XII, 379 (1766).

Size medium to small; head scales normal; loreal small and occasionally absent in one form; oculars 1–2; temporals 2 (1)–2 (3); frontal narrow behind in the young, broader in adults; upper labials 7; scales in 21 rows (occasionally varying from 17–23); anterior chin shields much the longest; ventrals 165–215; subcaudals 31–55; tail from one-fifth to one-seventh of the length.

This species covers the United States from the Atlantic coast to the central plains, and extends southwest into Mexico, and varies to an extreme degree, with the usual result in classification. Prof. Cope's scheme of the directive color variations of *O. doliatus*, guided by "bathmism," published in completed form in *The American Naturalist*, 1893, p. 1066, and finally in *The Primary Factors of Organic Evolution*, p. 29 (1896), is a remarkable example of the employment of that great gift, the scientific imagination, in a wrong field; for if that work be compared with a large series of *doliatus*, it becomes evident that the subspecies added by Cope to complete the chain are no more than selected cases, the numberless promiscuous variations being wholly ignored. The course of change from a brown-spotted to a red-ringed snake has not been as orderly, nor as easily marked off, as is there assumed, and in subdividing the species, natural limitations are not readily found.

Key to the Subspecies.

a.—An oblique streak behind the eye:

Dorsal spots reaching to about fifth row; an angular mark on head; ventrals 190–214, . . 1. *O. d. triangulus.*

Dorsal spots reaching to third or first row; head bands variable; ventrals 175–203, . . . 2. *O. d. clericus.*

b.—No oblique streak behind eye:

*a*¹.—Dorsal spots reaching outer row or ventrals; no distinct headbands, ... 3. *O. d. doliatus.*

*b*¹.—Black borders of dorsal spots forming rings around body; no alternating spots:

No black blotch on ventrals opposite dorsal spots; top of head mostly red, ... 4. *O. d. coccineus.*

A black blotch on ventrals opposite dorsal spots; top of head mostly black, . . . 5. *O. d. gentilis.*

Ophibolus doliatus triangulus Daudin.

Coluber triangulus Daud., Rept., VI, 322 (1803); *Ophibolus eximius* B. and G., *l. c.*, 87; *O. d. triangulus* Cope, *l. c.*, 610; *Coronella triangulum* (part) Boul., *l. c.*, II, 200; *Osceola doliata triangula* Cope, Rep. Nat. Mus., 885.

Largest of the subspecies; temporals 2–2; scales in 21 rows; ventrals 190–214; subcaudals 43–55; length about 1,100 mm.

Body color gray; the dorsal spots are about thirteen scales wide and rarely extend below the fifth row; they are chocolate brown, with black borders in adults, and quite red in the young, and number 40–46 on the body, and 10–13 on the tail; a second smaller alternating series on the sides, which does not reach the ventrals, and a third series of irregular black blotches on the ends of the ventrals; the belly is whitish, blotched with black. The first dorsal spot is commonly extended forward and ends in a conspicuous angle on the frontal, the arms of which enclose a triangular light patch; there is a black band across the prefrontals, often with a light centre, and a narrow dark oblique streak behind the eye, bordered above by a light one.

Hab.—Massachusetts to North Carolina; west to Wisconsin.

Ophibolus doliatus clericus B. and G.

Ophibolus clericus B. and G., *l. c.*, 88; *O. d. collaris, O. d. clericus* Cope, *l. c.*, 609, 610, and Rep. Nat. Mus., 886, 888; *O. d. temporalis* Cope, Am. Nat., 1893, 1068 and Rep. Nat. Mus., 889; *Coronella triangulum* (part) Boul., *l. c.*, II, 200.

Shorter than *O. d. triangulus;* ventrals 175–203; subcaudals 36–49; length 950 mm.

The dorsal spots are less numerous, from 21–36 on the body and 6–10 on the tail; they are wider and end from the third to the first row of scales; the alternating spots are correspondingly lower and invade the ventrals. The head markings are sometimes much as in *triangulus* but less distinct; there is usually an oval light patch surrounded by a black ring, in place of the triangular mark;

this is sometimes more or less extended transversely, becoming a half-collar; this is the form called *collaris* by Cope; often the anterior ring is represented by a black bar on the nape, and sometimes the ring is altogether absent and there is a light spot on each supraocular and another on the parietals, the rest of the head markings being more or less obsolete; this is *temporalis* Cope, but the intermediate stages are so many that it is quite arbitrary to regard these patterns as distinctive. The spots range in color from brown to red. The oblique streak behind the eye is present. *O. d. clericus* is a transitional form of great variability, and it is by no means always easy to distinguish it from *O. d. triangulus* on the one side and *O. d. doliatus* on the other; but I find that on the whole, compared with *triangulus*, it has a greater width and lessened number of dorsal spots and a want of definition in the head markings, associated with fewer ventrals and subcaudals; it may be distinguished from *O. d. doliatus* by the fact that the latter lacks the oblique streak behind the eye and rarely shows any head markings beyond a dark bar or blotch across the parietals.

Hab.—This subspecies seems to occupy the southern portion of the range of *O. d. triangulus*. I have seen no examples from further north than Trenton, N. J., and central Illinois.

Ophibolus doliatus doliatus L.

l. c., 379; *O. d. doliatus*, *O. d. parallelus* and *O. d. syspilus* (part) Cope, *l. c.*, 609, and Rep. Nat. Mus., 889–893; *Coronella gentilis* (part) Boul., *l. c.*, II, 201.

Form short and stout in adults; temporals 2–2 (3); ventrals 200–210; subcaudals 44–55; length about 670 mm. (tail 100).

Ground color grayish white or yellowish; dorsal spots brownish red, or red, with black borders; they are broad and reach to the first row of scales, often extending well on to the ventrals; the lateral spots are small and largely upon the ventrals, wholly so when the dorsals are widest. The belly is whitish or yellow with black blotches; the lower borders of the dorsal spots sometimes form nearly parallel black bands on the ventrals. The extreme of this disposition is *parallelus* Cope. The top of the head is sometimes almost entirely black, but more usually this is reduced to a bar across the parietals, the rest of the head being red or yellow. The post-orbital stripe of the previous forms is absent.

I cannot find characters which will bear examination in *syspilus*

Cope. No. 3,609, Academy coll., from Hennessey, Oklahoma, collected and labeled *syspilus* by Cope himself, has more black upon the head than most *O. d. doliatus*, while underneath, anteriorly, it has the paired rings of *O. d. coccineus*, on the rest of the belly having parallel lines formed by the lower borders of the dorsal spots quite as close together as those attributed by him to *parallelus*.

Hab.—Maryland to Florida; west to Illinois, Oklahoma and Texas.

Ophibolus doliatus coccineus Schlegel.

Coronella coccinea Sch., Ess. Phys. Serp., II, 67, Pl. 2 (1837); *Ophibolus doliatus* and *Osceola elapsoidea* B. and G., *l. c.*, 89, 133; *Osceola elapsoidea* and *O. d. coccineus* Cope, *l. c.*, 606, 609, and Rep. Nat. Mus., 900, 896; *Coronella gentilis* (part) and *C. doliata* (part) Boul., *l. c.*, II, 201, 205.

Body rather more slender; temporals 1–2; ventrals 175–204; subcaudals 31–54; length 535 mm. (tail 70).

Body color scarlet, completely encircled by pairs of black rings, with interspaces white in the young, yellow in adults; no lateral spots; belly paler than the back; top of head red, with the first black rings crossing the parietals. The pattern is formed by the obliteration of the lateral portion of the black borders of dorsal spots, and the extension of their transverse portion entirely around the body. The lateral spots have disappeared.

This subspecies seems to be adopting burrowing habits in portions of its range, and, as is frequent in such cases, the head plates and scales are becoming variable, specimens being found without a loreal and with the scales reduced to nineteen rows. This extreme reduction is *Osceola elapsoidea* B. and G., and is not common, but intermediate stages are frequent; out of some thirty specimens colored as in *coccineus*, I have met but two without a loreal and with 19 rows. The case is peculiar. If constant the distinction would be a generic one; on the other hand, the importance of the character involved would seem to lift it out of the ordinary category of intergradation, for we appear to have a subspecies being transformed into a genus under our eyes. On the whole, it may accord best with a sound method to take no note of this form at its present stage.

Hab.—North Carolina to Florida and west to the Mississippi river. Specimens without a loreal are rarely found outside of Florida.

Ophibolus doliatus gentilis B. and G.

Ophibolus gentilis B. and G., *l. c.*, 90; *O. d. annulatus, O. d. syspilus* (part), *O. d. gentilis* and O. *multistratus* Cope, *l. c.*, 609, 611; *Coronella gentilis* (part) and *C. micropholis* (part) Boul., *l. c.*, II, 201, 203; *Lampropeltis multistratus* and *L. annulatus* Stej., Proc. U. S. Nat. Mus., 1891, 502, 503; *Osceola doliata gentilis, annulatus, syspilus* (part) and *Ophibolus multistratus* Cope, Rep. Nat. Mus., 894, 895, 909.

Body rather short and stout; temporals 2–2 (3); scales in 21 rows (occasionally 23); ventrals 184–200; subcaudals 42–50; length about 700 mm.

The black rings usually extend around the body as in *O. d. coccineus*, and the colors are very similar, but the spaces between adjacent pairs of rings on the belly, opposite the red dorsal tracts, are more or less filled up by black; the whole top of the head is usually black except the end of the snout, which is red. Sometimes the scales in the yellow rings are marked with black, and often the black of the rings extends along the dorsal line, forming a dusky band on the red spaces; when the black suffusion is wanting we have *annulatus* Kenn., but it exists in all degrees.

A small specimen from Fort Harker, Kans., in the Cope collection, referred by him to *syspilus*,[20] is simply an immature *gentilis*.

O. multistratus Kenn. was founded on an individual from Nebraska having 8 upper labials; 23 rows of scales; three temporals in the second row, dorsal spots with borders uniting on the flanks, and no rings nor spots on the belly. Mr. Stejneger reports a second specimen[21] with but seven labials. Twenty-three rows of scales; temporals 2–3; with a greater or less number of dorsal spots are not without precedent in *O. doliatus;* indeed, three out of five *O. d. gentilis* which I have examined have three temporals in the second row. No. 3,613 Academy coll., from western Louisiana, is in company with a *gentilis* lacking the dorsal suffusion of black, and is exactly like it in all other respects, except that the belly is immaculate and the dorsal spots close on the outer row of scales; corresponding very closely to Kennicott's description of *multistratus*, with the scutellation of *gentilis*. I see no reason, therefore, why the first should not be included within the range of this variable form; the same may be said of *annulatus* Kenn., the differences of which are trivial.

[20] *Proc. U. S. Nat. Mus.*, 1888, p. 385.

[21] *Proc. U. S. Nat. Mus.*, 1891, p. 502.

The Mexican forms of *Ophibolus* with rings are closely related to this section. Mr. Boulenger has indeed united all of them with *annulatus*, under the name of *O. micropholis* Cope, and Dr. Gunther[22] has done the same, using the name *annulatus*.

The one specimen of *micropholis*, from Nicaragua, which I have seen, is certainly very like *gentilis*, and if the southern forms are to be united, as stated above, *gentilis* will probably have to be added, and that name will have priority.

Hab.—As here restricted, *gentilis* ranges from Nebraska to western Louisiana, Texas and northern Mexico.

Ophibolus getulus L.

Coluber getulus L., Syst. Nat., Ed. XII, 382 (1766).

Size large and stout; head not very distinct; scales in 21–23 rows (occ. 25); oculars 1–2; upper labials 7; temporals 2–2 (3); anterior chin shields longest; tail rather more than one-seventh of the length; color black or brownish black; white or yellow markings on separate scales, which frequently collect into lines across the back.

Hab.—The whole United States south of latitude 40°.

Key to the Subspecies.

a.—Scales in 21 or 23 rows:

Scales with yellow centres, often forming cross-bands, 1. *O. g. sayi.*

Black with white or yellow cross-bands, bifurcating on sides, 2. *O. g. getulus.*

b.—Scales in 23 or 25 rows:

Black with white rings which widen on the sides, 3. *O. g. boylii.*

Black with many rings broken; short white stripes, 4. *O. g. californiæ.*

Ophibolus getulus sayi Holbrook.

Coronella sayi Holb., No. Am. Herp., III, 99, Pl. XXII (1842); *Ophibolus splendidus* and *O. sayi* B. and G., 83, 84; *O. g. sayi* and *O. g. splendidus* Cope, *l. c.*, 612, 613, and Rep. Nat. Mus., 911 and 918; *Coronella getula* (part) Boul., *l. c.*, II, 197.

Dorsal rows of scales 21–23 (rarely 25); ventrals 200–224; subcaudals 40–60; length about 1,500 mm.

This form is exceedingly variable in pattern, but after examination of many specimens from all parts of its range, both living

[22] *Bio. Cent. Amer. Rept.*, p. 109, Pl. 23.

and alcoholic, I am not able to subdivide it. Typical *sayi* is black, and has each scale with a white or yellow centre; the belly is yellow with black blotches and the head is black with small yellow spots. In many cases the body spots collect into narrow transverse bands, leaving considerable spaces black with more or less traces of the yellow spots; sometimes the lower seven or eight rows of scales are spotted, and above them, on the dorsal area, the spots collect into narrow bands connecting the spotted sides and leaving a series of black, unspotted tracts on the back, three or four scales long and seven or eight wide. This is *splendidus* B. and G. At the present time the collection of the Zoölogical Society contains examples of both of these and more or less intermediate stages, collected at the same time at Pecos, Tex. On the other hand, No. 4,451 Academy coll. is a very fair example of *splendidus* collected at Reelfoot Lake, Tenn., in 1895, by Mr. Samuel N. Rhoads, and No. 3,585, from southern Illinois, clearly indicates the same pattern, which is therefore not associated with a restricted geographical area.

Hab.—Southern Illinois to Louisiana and through the southern portion of the plains to western Texas.

Ophibolus getulus getulus L.

Coluber getulus L., Syst. Nat., Ed. XII, 382 (1766); *Ophibolus getulus* B. and G., *l. c.*, 85; *O. g. getulus* and *O. g. niger* Cope, *l. c.*, 613; *Coronella getula* (part) Boul., *l. c.*, II, 197; *O. g. getulus* Cope, Rep. Nat. Mus., 914.

Size larger than *O. g. sayi;* ventrals 210–224; subcaudals 40–53; reaches a length of 1,800 mm.

Black, crossed by transverse bands of white or pale yellow, one and a half or two scales wide, at intervals of from five to ten scales, generally bifurcating on the flanks and joining the anterior and posterior ones, thus forming a chain-like pattern enclosing a series of black dorsal blotches. An occasional Florida specimen has some scales in the black areas with light centres. Two specimens, one from Florida and one from Alabama, now in the Zoological Gardens, have narrow white bands crossing the back, in one at intervals of seven, and in the other of ten scales, without bifurcating. The belly is white or yellow, with black blotches; top of head black, nearly all the plates marked with white or yellow; labials yellow, heavily margined with black. *O. g. niger*

does not appear to me to be more than a melanistic condition, approaches to which occur in all subspecies of *O. getulus.*

Hab.—Southern New Jersey to Florida and Louisiana; chiefly in the Atlantic States.

Ophibolus getulus boylii B. and G.

Ophibolus Boylii B. and G., *l. c.*, 82; *O. g. boylii* Cope, *l. c.*, 613, and Rep. Nat. Mus., 919; *Coronella getula* (part) Boul., *l. c.*, II, 197; *Lampropeltis boylii* Van Den., *l. c.*, 169.

Smaller than *O. g. sayi;* scales in 23 rows (occ. 25); ventrals 218–255; subcaudals 46–60. The largest measurement given by Mr. Van Denburg is 1,089 mm. (tail 135).

The body is black or brownish, with rings of white or yellow about two scales wide on the back, which widen on the sides until they are wider than the black interspaces; sometimes the direction of the rings is oblique, so that on the belly and even on the back the ends alternate, instead of meeting; the top of the head is black with small light spots and the snout is white or yellow. One of two living specimens lately received from Yuma, Ariz., by courtesy of Mr. Herbert Brown, has the light bands only indicated by white spots on a few lateral scales, across the back there being no more than a brown shade on the deep black of the body color; the top of the head is wholly black, the lower labials white, heavily margined with black.

Hab.—Nevada, Arizona and California.

Ophibolus getulus californiæ Blainville.

Coluber (*Ophis*) *californiæ* Blain., Nouv. Ann. du Mus., 1835, 292; B. and G., *l. c.*, 153; *O. g. californiæ* Cope, *l. c.*, 614, and Rep. Nat. Mus, 922; *Coronella getula* (part) Boul., *l. c.*, II, 197; *Lampropeltis californiæ* Van Den., *l. c.*, 172.

The relations of this snake to *O. g. boylii* are uncertain, and it is quite possible that the specimens known are but abnormal color variations of that species; there are usually 23 rows of scales; oculars 1–2 (3); temporals 2–3; ventrals 226–236; subcaudals 50–58. The body is black or brownish with little constancy in the markings; at times more or less of the white rings of *boylii* are present, but broken up and interspersed with short longitudinal white stripes, and according to Mr. Van Denburg, there is a white or yellow stripe or series of spots on the back; the head is colored as in *boylii,* and the belly is yellow or white, with or without black blotches.

Mr. Van Denburg's largest specimen measured 391 mm. (tail 41).

Hab.—Southern California and Lower California.

Ophibolus zonatus Blainville.

Coluber (*Zacholus*) *zonatus* Blain., *l. c.*, 293; *Ophibolus pyrrhomelas* Cope, *l. c.*, 610, and Rep. Nat. Mus., 907; *Coronella zonata* Boul., *l. c.*, II, 202; *Lampropeltis zonatus* Van Den., *l. c.*, 167.

Size rather smaller than *boylii*, body slender; scutellation generally as in that form; oculars 1 (2)–2; upper labials 7 (6); temporals 2 (1)–3 (2); scales in 21–23 rows; ventrals 199–224; subcaudals 45–66. Length about 900 mm. (tail one-sixth).

The body is encircled by narrow white or yellow rings, between which are black ones, which are more or less replaced or divided by red; all the rings are narrow, and the red is more pronounced anteriorly, being often altogether absent on the hinder part of the body; head yellow with a black band across the middle and another on the nape.

Mr. Boulenger, as it appears to me rightly, has referred this species to *zonatus* of Blainville.

Hab.—Arizona and southern California.

Ophibolus rhombomaculatus Holbrook.

Coronella rhombomaculata, Holb., *l. c.*, III, 103, Pl. 23; *O. rhombomaculatus* B. and G., *l. c.*, 86; Cope, *l. c.*, 610, and Rep. Nat. Mus., 903; *Coronella calligaster* (part) Boul., *l. c.*, II, 198; *Lampropeltis rhombomaculatus* Stej., Proc. U. S. Nat. Mus., 1891, 503.

Size moderate; body cylindrical and rigid; oculars 1–2; temporals 2–3; upper labials 7; anterior chin shields longest; scales in 23–21 rows; ventrals 200–212; subcaudals 44–51.

Length 790 mm. (tail 110).

Body color pale brown, with a dorsal series of small dark brown blotches with indistinct black borders; these are about eight or nine scales wide and not more than two long, and may number as many as fifty on the body; the interspaces are wider than the spots; a series of irregular small blotches on the side, often alternating with the dorsals and reaching the ventrals, the lower end sometimes breaking off and forming a detached spot on the end of the ventrals; belly yellowish white clouded with pale brown; no head bands, nor spots on the nape; a narrow oblique streak behind the eye; labials whitish slightly margined with dark brown.

Hab.—From the District of Columbia to South Carolina and west to the Alleghenies. Not common.

Ophibolus calligaster Harlan.

Coluber calligaster Harl., Jour. Acad Phila., 1827, 359; *O. calligaster* Cope, *l. c.*, 610, and Rep. Nat. Mus., 905; *Coronella calligaster* (part) Boul., *l. c.*, II, 198.

Larger than *rhombomaculatus;* oculars 1–2; temporals 2–3; upper labials 7; anterior chin shields longest; scales in 25 rows; ventrals 198–210; subcaudals 41–65. Length 1,180 mm. (tail 165).

Body color pale grayish brown; a dorsal series of subquadrate blotches, dark brown with narrow black borders, two to three scales long, eight to ten wide, somewhat emarginate before and behind; the interspaces are about equal to the spots; a smaller alternating series on the sides, which often form irregular vertical bars, and a third on the outer row of scales and ends of the ventrals; belly yellowish, with or without square black blotches on the centre. The head markings are sometimes very elaborate; in a beautiful specimen formerly in the collection of the Zoölogical Society, from Minnesota, the top of the head was yellowish, with a brown band across the prefrontals; an arrow headed mark, brown with a black border, the base on the frontal and apex just behind the parietals; a brown spot on the hinder end of the supraoculars and a faint dark oblique streak behind the eye. Labials yellow. An elongated brown blotch with black border, on each side, running back from the parietals to the neck. The markings are, however, not always as distinct; a second living specimen, from Missouri, has the whole color darker, the lateral spots quite obscure, no dark blotches on the ventrals, and the head markings indistinct. The general aspect of this snake is very like *rhombomaculatus,* but it has 25 rows of scales; the ground color is grayish brown; the dorsal spots are less narrow, and the head bands almost always distinguish it at a glance.

Hab.—Indiana to Minnesota and southwest to Kansas and northern Texas. Has been once reported from central Ohio.

STILOSOMA A. E. Brown.

Proc. Acad. Phila., 1890, 199; Cope, *l. c.*, 595, and Rep. Nat. Mus., 924; Boul., *l. c.*, II, 325.

Maxillary teeth small, smooth, subequal; body very slender and cylindrical; head not distinct; tail short; internasals frequently

fused with prefrontals; one nasal; no loreal; preocular usually distinct; prefrontals and parietals in contact with labials; scales smooth without pits; anal entire.

Stilosoma extenuatum A. E. Brown.

Proc. Acad. Phila., 1890, 199; Cope, *l. c.*, 595, and Rep. Nat. Mus., 924; Boul., *l. c.*, II, 325; Stejneger (fide Lœnnberg), Proc. U. S. Nat. Mus., 1894, 323.

Maxillary teeth 10–11, about equal in size; mandibular teeth 12. Body very slender, its diameter contained about one hundred times in its length; snout rather prominent; head scales variable; of nine specimens which I have examined, six have the internasals fused with the prefrontals, one has a distinct internasal on one side; two have the preocular fused with the frontal; in all the loreal is absent and the prefrontals and parietals are in contact with the labials; upper labials 6; third and fourth in orbit, fifth largest; lower labials, 5; post-oculars 2; temporals 1–1; 2 or 3 pairs of chin shields; scales smooth in 19 rows; ventrals 223–260; subcaudals 33–40. Length 575 mm. (tail 50).

Body color silvery gray, with 60–70 irregular dark-brown dorsal spots with blackish border, on the body and about twelve on the tail; on the dorsal line the interspaces are mottled with pale red; belly blotched with black which extends on the sides and often breaks into lateral spots; on the sides the scales are finely punctulated with black; a dark patch on the parietals, with a smaller one on each side of the neck; a dark post-ocular streak; forepart of head, chin and throat maculated with black.

Hab —Known only from Marion and Orange counties, Florida.

CARPHOPHIS Gervais.

Dict. d'Hist. Nat., III, 191 (1849); *Celuta* B. and G., *l. c.*, 129; *Carphophiops* Cope, *l. c.*, 596, and Rep. Nat. Mus., 734; *Carphophis* Boul, *l. c.*, II, 321.

Maxillary teeth smooth, subequal; a loreal; internasals one, two or absent; one nasal; no preocular; scales smooth, without pits, in 13 rows; anal divided; size very small; head flat and not distinct.

Hab.—North America.

Carphohis amœnus Say.

Coluber amœnus Say, Jour. Acad. Phila., IV, 237 (1825); *Celuta amœna* B. and G., *l. c.*, 129; *Celuta helenæ* Kenn., Proc. Acad. Phila., 1859. 100; *Carphophiops amœnus* and *C. vermis* Cope, *l. c.*, 596, 597; *Carphophis amœnus* Boul., *l. c.*, II, 324.

Head small and flat; internasals often absent; no preocular,

the loreal entering the orbit; post-ocular 1; temporals 1–1 (2); 13 rows of scales; ventrals 120–134; subcaudals 24–36.

Length 310 mm. (tail one-sixth).

Chestnut brown above, dark brown in adults: salmon color beneath.

Western specimens usually have but one temporal in the second row, and vary a trifle in the extension of the belly color on the sides; but as the species is a degraded and variable one, it does not seem necessary to regard them as distinct.

Hab.—New England to Kansas and southward.

FARANCIA Gray.

Zool. Misc., 68 (1842); B. and G., *l. c.*, 123; Cope, *l. c.*, 604, and Rep Nat. Mus., 740; Boul., *l. c.*, II, 290.

Maxillary teeth smooth, subequal; one loreal; one internasal; one nasal half divided; no preocular; scales smooth, without pits, in 19 rows; anal divided; size moderately large; body cylindrical and rigid; head not very distinct.

Hab.—North America.

Farancia abacura Holbrook.

Coluber abacurus Holb., No. Am. Herp., I, 119, Pl. 23 (1836); *Farancia abacura* B. and G., *l. c.*, 123; Cope, *l. c.*, 604, and Rep. Nat. Mus., 741; Boul., *l. c.*, II, 291.

Head small and hardly distinct from the body; one internasal; one nasal, half divided; no preocular, the loreal and prefrontal entering the orbit; post-orbitals 2; temporals 1–2; upper labials 7; 19 rows of scales; ventrals 168–206; subcaudals 34–49. Ordinary specimens are about 1,000 mm. long, but it reaches 1,400 (tail one-sixth to one-seventh).

Bluish black above with vertical red spots on the sides; belly red in life.

Hab.—North Carolina to Louisiana; possibly in Virginia.

ABASTOR Gray.

Cat. Snakes Br. Mus., 78; B. and G., *l. c.*, 125; Cope, *l. c.*, 603; Boul., *l. c.*, II, 289.

Maxillary teeth smooth, subequal; one loreal; two internasals; one nasal, half divided below the nostril; no preocular; scales smooth, without pits, in 19 rows; anal divided; size moderate; head not distinct; body cylindrical and rigid.

Hab.—North America.

Abastor erythrogrammus Daudin.

Coluber erythrogrammus Daud., Hist. des. Rept., 93, Pl. 83 (1803); *Abastor erythrogrammus* B. and G., *l. c.*, 125; Cope, *l. c.*, 603, and Rep. Nat. Mus., 738; Boul., *l. c.*, II, 290.

Head scarcely larger than the body; two small internasals; no preocular, the loreal and prefrontal entering orbit; post-oculars 2; temporals 1–2; upper labials 7; ventrals 157–185; subcaudals 37–55. Length 980 mm. (tail 130).

Bluish black above with three longitudinal red stripes; belly salmon color or reddish, with a series of bluish black spots on the ends of the ventrals; head dark, the plates sometimes with yellow margins; labials yellow, each with a dark spot.

Hab.—North Carolina to the Gulf coast; found once in Virginia by Prof. Cope.

VIRGINIA[23] B. and G.

l. c., 127; Cope, *l. c.*, 599, and Rep. Nat. Mus., 1006; Boul., *l. c.*, II, 288.

Maxillary teeth smooth, subequal; a loreal; two internasals; two nasals; no preocular; scales smooth, without pits, in 15–17 rows; anal divided; size small; head distinct.

Hab.—North America.

Scales in 15 rows; 2 preoculars, ...	1. *V. valeriæ.*
Scales in 17 rows; 1–3 preoculars, ...	2. *V. elegans.*

Virginia valeriæ B. and G.

l. c., 127; Cope, *l. c.*, 599, and Rep. Nat. Mus., 1006; Boul., *l. c.*, II, 289.

Head scales normal; oculars 2–2; temporals 1–2; upper labials 6; scales wide, in 15 rows; ventrals 115–127; subcaudals 25–37. Length 280 mm. (tail 40).

Yellowish or grayish brown, usually with small black dots forming longitudinal lines; belly dull yellow.

Hab.—Maryland west to the Mississippi; apparently not in Texas.

Virginia elegans Kennicott.

Proc. Acad. Phila., 1859, p. 99; Cope, *l. c.*, 599, and Rep. Nat. Mus., 1007; Boul., *l. c.*, II, 289.

Exactly like *V. valeriæ*, but the scales are narrower and in 17 rows and the post-oculars vary from one to three.

[23] Prof. Cope places *Virginia* among the genera in which the dorsal hypapophyses are continued to the tail. This is certainly not the case in one specimen of *V. elegans* which I have examined for this character.

A specimen in my collection, from Bay St. Louis, Miss., 186 mm. long (tail 27), has seven upper labials on one side; ventrals 117; subcaudals 29.

Hab.—Southern Illinois to Texas.

FICIMIA Gray.

Cat. Snakes, 80 (1849); *Gyalopium* Cope, *l. c.*, 603, and Rep. Nat. Mus., 947; *Ficimia* Boul., *l. c.*, II, 270.

Maxillary teeth smooth, equal; rostral enters between internasals and prefrontals, its upper border projecting; two internasals; one nasal, half divided, its anterior portion usually fused with the first labial; no loreal; one preocular; scales smooth, with pits, in 17 rows; anal divided; size moderate; head not very distinct.

Hab.—Southwestern United States and Mexico.

Ficimia cana Cope.

Gyalopium canum Cope, Proc. Acad. Phila., 1860, p. 243; *l. c.*, 603, and Rep. Nat. Mus., 947; *F. cana* Boul., *l. c.*, II, 272.

Rostral pointed behind, not in contact with the frontal; internasals small; nasal fused with the first labial, with a groove downward and backward from the nostril; no loreal, prefrontals reaching labials; oculars 1–2; temporals 1–2; upper labials 7; scales in 17 rows; ventrals 130–131; subcaudals 28. Length about 205 mm. (tail 28).

Reddish or yellowish, with brown, dark-edged cross-bands, about thirty in number, more or less broken into spots on the sides; belly yellowish white; a brown band across the head in front of the orbits, beginning on the labials, and another across the parietals.

Hab.—Western Texas to Arizona.

CHILOMENISCUS Cope.

Proc. Acad. Phila., 1860, 339; *l. c.*, 593, and Rep. Nat. Mus., 948; Boul., *l. c.*, II, 272.

Maxillary teeth smooth, subequal, the posterior sometimes a little enlarged; rostral prominent and separating the internasals; no loreal; one nasal, fused with the internasal; one preocular; scales smooth, with pits, in 13 rows; anal divided; size small; head not distinct.

Hab.—Nevada to Sonora; Lower California.

Preocular touching nasal; black cross-bands on back,
1. *C. ephippicus.*
Preocular not touching nasal; black rings around body,
2. *C. cinctus.*

Chilomeniscus ephippicus Cope.

Proc. Acad. Phila., 1875, 85; *l. c.*, 594; Rep. Nat. Mus., 951; Boul., *l. c.*, II, 273.

Head small with prominent snout; scales in 13 rows; rostral just reaches the prefrontals; nasal elongated and touching the preocular; oculars 1–2; temporals 1–1; upper labials 7; ventrals 109–113; subcaudals 22–28. Length 235 mm. (tail 30).

Yellow or red with a series of black cross-bands, the ends of which are rounded; on the tail they nearly form rings; the interspaces are quite as wide as the bands; belly white; top of head black; snout red.

Hab.—Nevada and Arizona; probably southern California.

Chilomeniscus cinctus Cope.

Proc. Acad. Phila., 1861, 303; *C. stramineus cinctus* Cope, *l. c.*, 594; *C. stramineus* (part) Boul., *l. c.*, II, 273; *C. cinctus* Cope, Rep. Nat. Mus., 952.

Very similar to *C. ephippicus*, but the nasal is separated from the preocular by the prefrontals, which reach the labials. Color reddish white; body completely encircled by black rings which are narrower on the belly.

But three specimens are known, and the full value of the characters are in doubt.

Hab.—Lower California and southern Arizona.

CEMOPHORA Cope.

Proc. Acad. Phila., 1860, 244; *l. c.*, 602, and Rep. Nat. Mus., 928; Boul., *l. c.*, II, 213; *Rhinostoma* B. and G., *l. c.*, 118.

Maxillary teeth smooth, longer behind, no interspace; a loreal; one or two preoculars; one nasal, sometimes divided; rostral slightly projecting; scales smooth, with pits, in 19 rows; anal entire; size moderate; head not distinct.

Hab.—North America.

Cemophora coccinea Blumenbach.

Coluber coccineus Blum., Voigt's Mag. of Phys., 1788, 11, Pl. 1; *Rhinostoma coccinea* B. and G., *l. c.*, 118; *Cemophora coccinea* Cope, *l. c.*, 602, and Rep. Nat. Mus., 928; Boul., *l. c.*, II, 214.

Body slender; head not distinct; snout projecting; eye small; one nasal, half divided or double; loreal small; oculars 1 (2)–2

(1); temporals 1 (2)–2; upper labials 6 or 7; scales in 19 rows; ventrals 156–188; subcaudals 35–45. Length 560 mm. (tail 80).

Back scarlet, crossed by pairs of black bands, each pair enclosing a whitish or yellow one about three scales wide; most scales in the yellow band are dotted with black; belly yellowish, unmarked; top of head red or yellow, with a black bar between the orbits.

Hab.—South Carolina and Florida, west to the Mississippi.

RHINOCHILUS B. and G.

l. c., 120; Cope, *l. c.*, 605, and Rep. Nat. Mus., 930; Boul., *l. c.*, II, 212.

Maxillary teeth smooth, increasing posteriorly, no interspace; one loreal; one or two preoculars; two internasals; two nasals; rostral somewhat projecting; scales smooth, with pits, in 17–23 rows; anal entire; subcaudals usually entire; size medium; head slightly distinct.

Hab.—North and South America.

Rhinochilus lecontii B. and G.

l. c., 120; Cope, *l. c.*, 606, and Rep. Nat. Mus., 931; Boul., *l. c.*, II, 212; Van Den., *l. c.*, 174.

Body moderately stout; head scales normal; one large preocular, occasionally with a small one below; two post-oculars; temporals 2–3 (one in my collection has a small additional temporal in the first row on one side); upper labials 8; scales in 23 rows; ventrals 189–212; subcaudals 40–55, not divided. The largest I have seen, measured 965 mm. (tail 135).

There is a series of blotches on the back, alternating black and red or orange: the red ones nearly quadrate, the black ones transversely wider; on the sides, below the blotches, some scales are marked with black or yellow; belly white or yellow, with black blotches on the ends of some ventrals. A living specimen from Pecos, Tex., has twenty-seven brilliant scarlet blotches on the body and twelve on the tail; below the scarlet blotches each scale is yellow with a black centre, while on the corresponding portion of the black areas, which extend to the fourth row, each scale has a yellow centre; many of the scales in the outer rows are tinged with red. The snout in front of the frontal plate is red, behind that black, each scale marked with yellow. Labials yellow, all the upper ones posterior to the third, heavily margined

with black. A second specimen is very similar in color, but the black on the ends of the ventrals often runs up on the scales to about the fourth row.

According to Mr. Van Denburg, the spots on the back, which ordinarily are red, are at times white, but I have never myself seen such a specimen.

Hab.—Southwestern Kansas and western Texas to California.

HYPSIGLENA Cope.

Proc. Acad. Phila., 1860, 246; *l. c.*, 617, and Rep. Nat. Mus., 952; Boul., *l. c.*, II, 208,

Posterior maxillary teeth strongly enlarged, smooth, diacranterian; one loreal; two internasals; two nasals: vertical, elliptical pupil; scales smooth, with pits, in 19–21 rows; anal divided; size medium to small; head distinct.

Hab.—North and Central America.

Hypsiglena ochrorhyncha Cope.

Proc. Acad. Phila., 1860, p. 246; *l. c.*, 617, and Rep. Nat. Mus., 953; Boul., *l. c.*, II, 209; *H. chlorophæa*, *H. ochrorhyncha* and *H. texana* Stej., No. Am. Fauna, No. 7, 205.

Size small; body round; head distinct; head plates normal; 2 nasals; 1 loreal; 1 large preocular, with usually a small one below it; post-oculars 2; labials 8; temporals 1–2; scales in 21 rows; ventrals 168–187; subcaudals 40–55.

Length 320 mm. (tail 60).

Gray or yellowish, with a dorsal series of dark-brown blotches and two alternating series on each side; a dark stripe through each eye, running back to the nape, and a median one between them; upper surface of head and labials faintly dotted with brown; belly white.

The convexity of the head attributed to *H. texana* Stejn. appears to me abnormal, and the difference in the lateral head stripe is trivial.

Hab.—Texas to southern California; northern Mexico.

RHADINEA Cope.

Proc. Acad. Phila., 1863, 100, and *Dromicus*, *l. c.*, 618; *Liophis* (part) and *Rhadinea* Boul., *l. c.* II, 127 and 160; *Rhadinea* Cope, Rep. Nat. Mus., 754.

Posterior maxillary teeth slightly lengthened, smooth, sometimes a slight interspace; one loreal; one preocular; two internasals; two

nasals; scales smooth, without pits, in 15–21 rows; anal divided; size very small; head distinct.

Hab.—North and South America.

Rhadinea flavilata Cope.

Dromicus flavilatus Cope, Proc. Acad. Phila., 1871, p. 222, and *l. c.*, 618; *Liophis flavilatus* Boul., *l. c.*, II, 143; *Rhadinea flavilata* Cope, Trans. Am. Phil. Soc., XVIII, 202 (1895), and Rep. Nat. Mus., 759.

Head slightly distinct; maxillary teeth 12–13, the last two enlarged and separated from the others by a slight interval; mandibular teeth 17, subequal; head plates normal; loreal obliquely quadrangular; nasal indistinctly divided above and below the nostril; one large preocular; two post-oculars, the lower one small; temporals 1–2; upper labials 7; lower labials 8; posterior chin shields longest and separated behind; scales in 17 rows, smooth, without pits; ventrals 126–129; subcaudals 66–77.

Length 270 mm. (tail 77).

Reddish brown above, somewhat lustrous in life, each scale finely dotted with dark brown; belly light yellow, invading the edges of the two outer rows of scales; top of head a little darker than the back and indistinctly vermiculated with light brown; a faint dark band from the rostral to the temporals, slightly bordered above with yellow and below with black; labials colored like the ventrals, the upper ones slightly spotted with dark brown. The foregoing description is taken from two living specimens, one from Florida and one from Bay St. Louis, Miss.

As none of the three examples of this rare snake which I have examined, possess scale pits, it cannot be placed in *Liophis*, as is done by Boulenger, but falls into the section of *Rhadinea* with slightly diacranterian dentition.

Hab.—North Carolina to Florida and Mississippi.

HETERODON Latreille.

Hist. des Rept., IV., 32 (1800); B. and G., *l. c.*, 51; *l. c.*, Cope, 153, and Rep. Nat. Mus., 760; Boul., *l. c.*, II., 153.

Posterior maxillary teeth much enlarged, smooth, an interspace; body stout; head long and slightly distinct; snout short; rostral strongly projecting and recurved; a small plate behind the rostral; sometimes a number of small scales separating internasals and prefrontals; eye surrounded by a circle of scales; 1 loreal; 2 nasals,

occasionally a small post-nasal below; scales keeled, with two pits, in 23–25 rows; anal divided.

Hab.—North America.

The "sand snakes," "hog-nosed snakes," or "blowing vipers," as they are variously called, are able to expand and flatten the anterior portion of the body when alarmed, and thereby to assume a threatening aspect, as in the cobras, but they are absolutely harmless.

Key to the Species.

a.—Rostral narrower than space between eyes:
No scales between prefrontals; size larger, 1. *H. platyrhinus.*
Prefrontals separated by scales; size smaller, 2. *H. simus.*
b.—Rostral as broad as space between eyes:
Prefrontals and internasals separated by scales, 3. *H. nasicus.*

Heterodon platyrhinus Latreille.

l. c. 32; *H. platyrhinos, H. cognatus, H. niger* and *H. atmodes* B. and G., *l. c.*, 51–57; *H. platyrhinus* Cope, *l. c.*, 643, and Rep. Nat. Mus., 761; Boul., *l. c.*, II, 154.

Largest of the genus; maxillary teeth 11–12, the last two much enlarged and separated by a wide interval; 1, sometimes 2, small azygous plates behind the rostral, separating internasals; usually without small plates between the prefrontals; frontal a little longer than broad; 9–11 scales in the orbital ring, in addition to the supraoculars; upper labials 8 (9); temporals 4 (3)–5; 1 pair of chin shields; scales usually in 25 rows (occ. 23); ventrals 120–150; subcaudals 37–60. Length 810 mm. (tail 153).

Color variable, sometimes entirely black above; usually brown, reddish brown or yellow, with a dorsal series of dark brown or black spots, separated by narrow interspaces, one and a half or two scales wide; a lateral alternating series of small dark blotches, and sometimes traces of a third; belly greenish white, yellowish or reddish, often clouded with dusky; two dark blotches on the nape, a band across the prefrontals and an oblique streak behind the eye.

Hab.—New Jersey west to the Missouri river, and south to Florida and Texas.

Heterodon simus L.

Coluber simus L., Syst. Nat., Ed. XII, 375; *H. simus* B. and G., *l. c.*, 59; Cope, *l. c.*, 643, and Rep. Nat. Mus., 770; Boul., *l. c.*, II, 156.

Smaller than *platyrhinos;* snout moderate; maxillary teeth 10–11; 3 to 9 scales, in addition to the azygous plate separating the internasals and prefrontals; frequently a small subpost-nasal; frontal as broad as long; 10–11 scales in orbital ring; labials 8; temporals small; 1 pair of chin shields; scales in 25 rows (rarely 27); ventrals 114–134; subcaudals 30–55. Length 490 mm. (tail 90).

Color usually grayish or yellowish brown, with the dorsal series of spots blackish brown, separated by narrow interspaces usually tinged with yellow; one or two series of small blackish blotches on the sides; belly white or yellow, more or less clouded with dusky; two dark blotches on the nape, parietals blackish, the bar on prefrontals and post-ocular streak present. In some color phases this form resembles both of the other species; but may always be known from *platyrhinus* by the small plates behind the rostral being from 4–10, instead of one or two; and from *nasicus* by the presence of two more scale rows and a much lighter abdomen.

Hab.—Georgia and Florida to the Mississippi.

Heterodon nasicus B. and G.

l. c., 61; *H. n. nasicus* and *H. n. Kennerlyi,* Cope, *l. c.*, 644, and Rep. Nat. Mus., 772, 773; *H. nasicus* Boul., *l. c.*, II, 156.

Snout very short and much recurved; maxillary teeth 8–10; azygous plates as in *simus,* sometimes 20 or more; 10–11 scales in orbital ring; as a rule no inferior post-nasal; sometimes an additional loreal; upper labials 8; 1 pair of chin shields; scales in 23 rows; ventrals 128–146; subcaudals 32–45 (a specimen in my collection has one or two subcaudals undivided). The largest I have seen, came from Pecos, Tex., and measured 610 mm. (tail 78); another, 555 mm. (tail 100).

Grayish brown, sometimes yellow on the back; a dorsal and two lateral rows of spots, usually smaller than in *simus* and often not distinct, sometimes the dorsal spots are only indicated by a darker shade; the belly is whitish with black blotches, usually entirely black in the centre; three elongated black blotches on the nape; an oblique streak behind the eye; a narrow band across the frontal and another on the prefrontals; parietals blackish.

Hab.—Montana to Texas and Arizona; northern Mexico.

TRIMORPHODON Cope.

Proc. Acad. Phila., 1861, 297; *l. c.*, 678, and Rep. Nat. Mus., 1101; Boul., *l. c.*, III, 53.

Posterior maxillary teeth elongated, grooved and separated by an interval; anterior teeth elongated; 2 loreals; 1 or 2 preoculars; 2 internasals; 2 nasals; pupil vertical; scales smooth, with pits, in 21–27 rows; anal divided; size medium.

Hab.—North America and Mexico.

Trimorphodon lyrophanes Cope.

l. c., 297; *l. c.*, 679, and Rep. Nat. Mus., 1102; Boul., *l. c.*, III, 56.

Seven maxillary teeth; head distinct; head plates normal; 2 loreals, one in front of the other; 2 preoculars, usually a small subocular; 3 post-oculars; labials 9; scales in 21 rows; ventrals 236; subcaudals 70. Length 710 mm. (tail 110).

Light gray; deep brown spots, in pairs, on the back (21 pairs in the type specimen); an irregular series of lateral spots; belly white, with small dark spots on the ends of some ventrals; head light gray, banded with darker.

Hab.—Arizona and Lower California.

SIBON Fitzinger.

Neue Class Rept., 29 (1826); Cope, *l. c.*, 676, and Rep. Nat. Mus., 1106; *Leptodira* (part) Boul., *l. c.*, III, 88.

Posterior maxillary teeth elongated, grooved and separated by an interspace; 1 loreal; 1 to 3 preoculars; 2 nasals; 2 internasals; pupil vertical; scales smooth, with pits, in 19–25 rows; anal divided; size moderate.

Hab.—North and South America.

Cope appears to be justified in separating the American species with divided anal, from the Asiatic with single anal; *Leptodira* Gunther having included both, an arrangement which is followed by Boulenger.

Sibon septentrionalis Kennicott.

Dipsas septentrionalis Kenn., U. S. Mex. Bound. Surv., II, 16, Pl. 8, fig. I; *Sibon septentrionale* Cope, *l. c.*, 678, and Rep. Nat. Mus., 1107; *Leptodira septentrionalis* Boul., *l. c.*, III, 93.

Head very distinct; body tapering; head scales normal; 3 preoculars, the lower one very small; post-oculars 2; temporals 1–2; labials 8; scales in 21–23 rows; ventrals 194; subcaudals 65–72. Length 750 mm. (tail about one-fifth).

Grayish or yellow above, with dark-brown saddle-shaped spots, six or eight scales long and nearly reaching the ventrals; belly yellowish; top of head and part of the upper labials light brown with blackish markings; an indistinct pale band across the nape.

Hab.—Texas to Arizona; northern Mexico.

ERYTHROLAMPRUS Wagler.

Syst. Amph., 187 (1830); Cope, *l. c.*, 676; Boul., *l. c.*, III, 199; *Coniophanes* Cope, Rep. Nat. Mus., 1096.

Posterior maxillary teeth elongated, grooved and separated by an interspace; 1 loreal; 1 or 2 preoculars; 2 nasals; pupil round; scales smooth, without pits, in 15–25 rows; anal divided; size moderate.

Hab.—North and South America.

Erythrolamprus imperialis Baird.

Tæniophis imperialis Baird, U. S. Mex. Bound. Surv., II, 23, Pl. XIX, fig. 1; *E. imperialis* Cope, *l. c.*, 676; Boul., *l. c.*, III, 206; *Coniophanes imperialis* Cope, Rep. Nat. Mus., 1097.

Head not very distinct; size small; head shields normal; 2 nasals; 1 loreal; oculars 1–2; temporals 1–2; upper labials 8 (7); scales in 19 rows; ventrals 120–143; subcaudals 67–94. Length about 410 mm. (tail 160).

Light brown, with a blackish vertebral stripe, and one on each side; scales below the lateral stripes pale brown; a yellow line with black edges from nostril to temporals; upper labials whitish, dotted with black; belly reddish, sometimes with black dots.

Hab.—Southern Texas to Central America.

TANTILLA B. and G.

l. c., 131; Cope, *l. c.*, 597, and Rep. Nat. Mus., 1110; *Homalocranium*[16] Boul., *l. c.*, III, 212.

Posterior maxillary teeth slightly elongated, grooved and separated by an interspace; no loreal; 1 preocular; 2 nasals; 2 internasals; scales smooth, without pits, in 15 rows; anal divided; size small; head flat and not very distinct.

Hab.—North and South America.

[16] *Tantilla* is preferred to *Homalocranium* for the reasons given under *Storeria*.

Key to the Species in United States.

a.—Upper labials 7:
  a[1].—A yellow or white collar on nape:
    A black band behind collar; ventrals less than 158, 1. *T. coronata.*
    Black dots behind collar; ventrals more than 167, 2. *T. eiseni.*
  b[1].—No collar on nape; head black, . . 3. *T. nigriceps.*
b.—Upper labials 6, ... 4. *T. gracilis.*

Tantilla coronata B. and G.

l. c., 131; Cope, *l. c.*, 598, and Rep. Nat. Mus., 1114; *Homalocranium coronatum* Boul., III, 218.

Size small and slender; head not distinct; head plates normal; no loreal; posterior nasal in contact with preocular; oculars 1–2; temporals 1–1 (2); upper labials 7; scales in 15 rows; ventrals 138–158; subcaudals 35–58. Length 220 mm. (tail 35).

Reddish brown above; belly whitish; top of head dark brown with a yellow cross-band behind the parietals, bordered behind by a black one two scales wide.

Hab.—Gulf States; Georgia to Mississippi.

Tantilla eiseni Stejneger.

Proc. U. S. Nat. Mus., 1895, 117.

Size rather larger; post-nasal almost separated from the preocular by the prefrontal; ventrals 167–181; subcaudals 58–65. Length 365 mm. (tail 82). Much resembling *T. coronata*, but with a more slender body, a longer tail and a greater number of ventrals and subcaudals. The only specimens known have been more than twenty years in spirits, but from Mr. Stejneger's description the color must have been like *coronata*, but the collar was bordered behind by black dots in place of a band.

Hab.—Seven specimens known, all from Fresno, California.

Tantilla nigriceps Kennicott.

Proc. Acad. Phila., 1860, 328; Cope, *l. c.*, 598, and Rep. Nat. Mus., 1113; *H. planiceps* (part) Boul., *l. c.*, III, 226.

Size small; post-nasal usually in contact with preocular; oculars 1–1 (2); temporals 1–1; upper labials 7; scales in 15 rows; ventrals 121–168; subcaudals 42–66. Length 275 mm. (tail one-fifth).

Yellowish brown above; white underneath; top of head blackish brown; no collar.

Mr. Boulenger considers this form identical with *Coluber planiceps* Blain.; the type of that species, however, came from 'Lower California, and there is no proof that *nigriceps* extends west even to California proper. Van Denburg does not mention it as an inhabitant of the State, and the evidence of its presence even in Arizona is not of the best.

Hab.—Texas and New Mexico; possibly Arizona.

Tantilla gracilis B. and G.

l. c., 132; Cope, *l. c.*, 598, and Rep. Nat. Mus., 1111; *H. gracilis* Boul., *l. c.*, III, 228.

Size small; post-nasal occasionally separated from preocular by prefrontal; oculars 1–1; temporals 1–1; upper labials 6; 15 rows of scales; ventrals 112–137; subcaudals 41–51. Length 215 mm. (tail 43).

Reddish or greenish brown above, some scales speckled with darker; belly salmon color in life; top of head dark brown; labials yellowish brown. Through the courtesy of Mr. Julius Hurter, of St. Louis, the Zoölogical Society has lately received five living specimens of this little snake, taken by him in Jefferson county, Mo.

Hab—Missouri to Texas.

ELAPS Schneider.

Hist. Amph., II, 289 (1801); B. and G., *l. c.*, 21; Cope, *l. c.*, 679, and Rep. Nat. Mus., 1119; Boul., *l. c.*, III, 411.

A pair of large, perforated poison fangs in front; no other maxillary teeth; no loreal; 2 internasals; 2 nasals; pupil vertical, elliptical; scales smooth, without pits, in 15 rows; anal divided; subcaudals single or double, or both; body cylindrical; head not very distinct; tail short.

Hab.—North and South America.

The snakes of this genus are beautifully ringed with black, re and yellow in varying proportions. All are venomous and structurally related to the cobras. Several species of harmless snakes so nearly resemble them in color, especially the red and yellow ringed forms of *Ophibolus doliatus*, that novices in herpetology should beware of handling living specimens presenting these colors, until assured that they are not dealing with an *Elaps*. There are some twenty-five known species, extending from South Carolina to Brazil, two only being found within the United States.

Snout black; parietals yellow; first wide ring black,
1. *E. fulvius.*
Snout and parietals black; first wide ring red, 2. *E. euryxanthus.*

Elaps fulvius L.

Coluber fulvius L., Syst. Nat., Ed. XII, 381; *Elaps fulvius*, *E. tenere* and *E. tristis* B. and G., *l. c.*, 21–23; *E. fulvius* and *E. distans* Cope, *l. c.*, 680, 681, and Rep. Nat. Mus., 1120, 1123; *E. fulvius* (part) Boul., *l. c*, III, 422; *E. fulvius* Stej., Rep. U. S. Nat. Mus., 1893, 359.

Rostral small, not extending between the internasals, which are rather small; oculars 1–2; temporals 1–1 (2); upper labials 7, third largest; ventrals 203–237; subcaudals 25–45. The largest I have seen, measured 930 mm. (tail 70).

There are 11–17 black rings from seven to ten scales long, and the same number of red ones from 8–12 scales long on the body; the black ones are bordered before and behind by yellow rings, one or two scales long; many scales in the red rings are mottled with black; there are three or four black and an equal number of yellow rings on the tail, but no red. Top of the head in advance of the parietals is black, followed by a yellow ring extending to the angle of the mouth; then a black one 5–8 scales long. Examples are said to be found in Florida with the black rings much narrowed, and the snout red instead of black. These are referred by Prof. Cope to *E. distans* Kenn., the type of which was from Chihuahua. Such specimens must in any event be very rare, for the Zoölogical Society has received more than eighty *Elaps* from Florida, not one of which has exhibited the characters of *distans.*

Hab.—South Carolina to western Texas and up the Mississippi valley, occasionally to southern Ohio; northern Mexico.

Elaps euryxanthus Kennicott.

Proc. Acad. Phila., 1860, 337; Cope, *l. c.*, 681, and Rep. Nat. Mus., 1125; Boul., *l. c.*, III, 415; Stej., *l. c.*, 363.

This little-known species closely resembles *E. fulvius;* the rostral is produced posteriorly and extends slightly between the internasals; the frontal is very small; the black of the snout extends back over the parietals and is followed by a yellow ring, then by a wide red one; the red rings do not show black mottling on the scales. Ventrals 215–241; subcaudals 21–29.

Hab.—Central and southern Arizona; northern Mexico.

VIPERIDÆ.

Key to the Genera.

a.—No rattle, ... ANCISTRODON.
b.—A rattle:
Top of head with large plates, ... SISTRURUS.
Top of head with small scales, ... CROTALUS.

ANCISTRODON Beauvais.

Trans. Amer. Phil. Soc., IV, 381 (1799); *Agkistrodon* and *Toxicophis* B. and G., *l. c.*, 17–19; *Ancistrodon* Cope, *l. c.*, 681, and Rep. Nat. Mus., 131; Boul., *l. c.*, III, 519.

A pair of large erectable, perforated poison fangs in front of upper jaw; no other maxillary teeth; a pit between the eye and the nostril; no rattle; top of head covered with large plates; scales keeled, with pits, in 21–27 rows; anal entire; subcaudals single or double, or both; size large to medium.

Hab.—Asia, North and Central America.

Key to the Species of the United States.

No loreal plate; a pair of post-parietals, . . 1. *A. piscivorus.*
A loreal plate; no post-parietals, ... 2. *A. contortrix.*

Ancistrodon piscivorus Lacèpéde.

Crotalus piscivorus Lacep., Serp., II, 130 and 424 (1789); *Toxicophis piscivorus* and *T. pugnax* B. and G., *l. c.*, 19, 20; *A. piscivorus* Cope, *l. c.*, 683, and Rep. Nat. Mus., 1133; Boul., *l. c.*, III, 520; Stej., *l. c.*, 406.

Size large; body very stout; tail short, from one-seventh to one-sixth of length; head broad behind, flat on top; snout rounded; canthus sharp; head plates normal, but with usually a pair of small additional plates behind parietals; no loreal; preoculars 2, the upper much the largest; post-oculars 2, with one or two suboculars; upper labials 8 (occ. 7), the third entering the orbit; scales in 25 rows, strongly keeled; ventrals 130–147; subcaudals 39–48, more or less of which are undivided, usually the anterior ones. A specimen from Florida, now living in the Zoölogical Gardens, 1,550 mm. long and 250 mm. in circumference, is the largest I have ever seen.

The color pattern is obscure; half-grown examples are usually dark chestnut or greenish olive, with blackish brown cross-bands with irregular borders. Older ones become much darker and the bands are obscured; belly yellow, clouded with brown. Head

blackish brown; an oblique streak behind the eye and a yellowish white band on the upper labials.

Hab.—North Carolina and Florida, through the Gulf States to Texas; up the Mississippi valley, occasionally to Illinois.

The name " water moccasin," properly belonging to this species, is often wrongly applied to large, dark individuals belonging to *Tropidonotus;* but the shape of the head, the presence of the loreal pit, and the sharply tapering tail, easily distinguish it.

Ancistrodon contortrix L.

Boa contortrix L. Syst. Nat., Ed. XII, 373; *Agkistrodon contortrix* B. and G., *l. c.*, 17; Stej., *l. c.*, 401; *Ancistrodon contortrix* Cope, *l. c.*, 683, and Rep. Nat. Mus., 1135; Boul. *l. c.*, III, 522.

Smaller and less stout than *A. piscivorus;* no post-parietal plates; loreal present; eye entirely separated from labials by the suboculars; upper labials 8 (occ. 7); scales in 23 rows (rarely 25); ventrals 145–155; subcaudals 31–52, some of the anterior ones usually undivided. A large specimen from Pennsylvania measures 1,000 mm. (tail 130).

Body color peculiar yellowish pink, often pale drab, crossed by irregular brownish red bands with darker borders, wider and often with pale centres on the sides; a series of small circular brownish red spots on outer rows and ends of the ventrals, anteriorly these are mostly on the ventrals; belly yellowish or pink, sometimes maculated with darker; chin and throat yellowish white; sides of head cream color; top often bright copper, whence the name " copperhead." In life, the markings vary greatly in outline and richness of color.

Hab.—Massachusetts south to Florida; west to Illinois, Oklahoma and central Texas.

SISTRURUS Garman.

No. Amer. Rept., 110 (1883); *Crotalophorus* B. and G., *l. c.*, 11; Cope, *l. c.*, 684; *Sistrurus*, Boul., *l. c.*, III., 569; Stej., *l. c.*, 410; Cope, Rep. Nat. Mus., 1140.

A pair of large erectable, perforated poison fangs in front of upper jaw: no other maxillary teeth; loreal pit and rattle present; top of head covered with large plates; scales keeled, with pits, in 21–25 rows; anal and subcaudals not divided; sizes small to medium.

Hab.—North America and Mexico.

Key to the Species in United States.

Post-nasal in contact with preocular; the light line to angle of mouth begin at nostril, ... 1. *S. catenatus.*
Post-nasal separated from preocular, by loreal; light line to angle of mouth begins at the eye, ... 2. *S. miliarius.*

Sistrurus catenatus Rafinesque.

Crotalinus catenatus Raf., Amer. Monthly Mag., 1818, p. 41.

Short and stout; tail about one-ninth of length; rattle small; head plates normal; there is no large loreal, and the upper preocular is in contact with the post-nasal; occasionally the anterior end of the preocular is cut off, forming a small upper loreal; scales in 23–27 rows, one or two of the outer smooth; ventrals 135–157; subcaudals 17–34.

The color is gray, brown or even black, with seven series of blotches on the back; the dorsal series dark brown with a narrow light border, anteriorly often crescent-shaped, posteriorly becoming subcircular; the second series roundish and indistinct, more or less alternating with the dorsals; third, vertically elongated, colored like the dorsals and opposite to them; fourth small and on the outer rows and ends of the ventrals; belly yellowish, more or less marked with black. Top of head with a light band across the anterior end of frontal; two dark bands running back from the supraoculars to the first dorsal spot, and a dark spot between them on the parietals and frontal; a dark oblique streak behind the eye bordered above and below by a light line, the lower one beginning at the nostril and running to the angle of the mouth; two light lines from the loreal pit to the labial border.

It has been customary to divide this species into a northern and a southern race, but the characters ascribed to them are less constant than has been supposed, and they were, in fact, united by Mr. Boulenger; nevertheless, the greater proportion of the individuals found within each geographical area do present sufficient differences to warrant their separation:

Scales usually in 25 rows; dorsal spots usually less than 40, 1. *S. c. catenatus.*
Scales usually in 23 rows; dorsal spots usually more than 40, 2 *S. c. eonsors.*

Sistrurus catenatus catenatus Rafinesque.

l. c., 41; *Crotalophorus tergeminus* and *C. Kirtlandii* B. and G., *l. c.*, 14, 16. *C. c. catenatus* Cope, *l. c.*, 685; *Sistrurus catenatus* (part) Boul., *l. c.*, III, 570; *S. catenatus Stej.*, *l. c.*, 411; *S. c. catenatus* Cope, Rep. Nat. Mus., 1146.

In this northern race, the scale rows are usually 25, but occasionally 23 or 27; the dorsal spots are larger and fewer in number than in *consors*, being generally from 37–41 in number, of which 3–5 are on the tail, but an occasional example has them as numerous as in the southern form. No. 7,241 Academy coll. is a *catenatus* from Fort Riley, Kans., with 27 rows of scales and 44 dorsal blotches, of which 9 are on the tail, leaving the number of body spots about as they should be. No. 7,240 has also 27 rows, and only 37 spots, with a black belly. Nos. 7,243–44 are two interesting specimens, collected together in Michigan; the former has 23 rows and 37 spots and the belly is immaculate yellow; the other one has 27 rows and the belly is wholly black.

The colors are usually darker and the lateral spots more distinct than in *consors*. Occasional examples are entirely black. Ventrals 136–150; subcaudals 17–29.

Length about 900 mm.

Hab.—Ohio to Kansas, and north into Canada. Formerly found in western New York, but it has now disappeared from most cultivated localities.

Sistrurus catenatus consors B. and G.

Crotalophorus consors and *C. Edwardsii* B. and G., *l. c.*, 12, 15; *C. c. edwardsii* Cope, *l. c.*, 685; *Sistrurus catenatus* (part) Boul., *l. c.*, III, 570; Garman., Bull, Ess. Inst., XXIV, 101, 1894; *S. c. consors* and *S. c. edwardsii* Stej., *l. c.*, 415, 416; *S. c. edwardsii* Cope, Rep. Nat. Mus. 1144.

Compared with the preceding this subspecies is probably rather smaller; the scutellation is similar, but the scale rows are usually 23, though sometimes 25; the dorsal spots are smaller and more numerous, being in most cases 40–50 in number, of which 4–6 are on the tail. Variations toward *S. c. catenatus* are not uncommon, however; No. 7,234 Academy coll. from Hennessey, Okla., labeled *edwardsi*, has 25 rows of scales and 44 spots, and No. 7,235, from Texas, has 23 rows of scales and but 37 spots.

The correct name of the southwestern form of *Sistrurus* has been in doubt, owing to the loss of Baird and Girard's type of *C. consors*, and the omission of some important details from their

original description. The Zoölogical Society has lately received a living *Sistrurus* from Port Lavaca, Calhoun county, Tex , practically the type locality of *consors*, which agrees with Baird and Girard's description of that species in all respects, as well as with Garman's Matagorda specimens. It has 25 rows of scales, the two outer, smooth; 53 dorsal blotches (45 on the body and 8 on the tail); ventrals 153; subcaudals 27; length 520 mm. (tail 70). There is no large loreal and the preocular is in full contact with the post-nasal. As *edwardsi* is known to sometimes present 25 scale rows, there is nothing to separate the two forms except an insignificant difference in the number of spots. Regarding them as identical, the name *consors* has priority.

Hab.—Indian Territory to northern Mexico; west to Arizona.

Sistrurus miliarius L.

Crotalus miliarius, L., Syst. Nat., Ed. XII, 372; *Crotalophorus miliarius* B. and G., *l. c.*, 11; Cope, *l. c.*, 685; *Sistrurus miliarius* Boul., *l. c.*, III, 569; Stej., *l. c.*, 418; *Sistrurus miliarus*, Cope, Rep. Nat. Mus., 1141.

Smaller and more slender than *S. catenatus;* rattle very small; loreal present, separating the post-nasal from the preocular; scales in 23 rows (occ. 21); ventrals 127–140; subcaudals 20–36. Length about 550 mm. (tail between one-seventh and one-eighth).

Gray, yellowish or brown, more or less dark; seven series of blotches on the body, disposed much as in the genus; the dorsals are dark, often purplish, irregular in shape, and from 38–45 in number; the interspaces on the vertebral line are often red; the head markings are much as in the last species, but the dark spot on the parietals is absent and the lower light line on the side of the head begins on the post-oculars, instead of the nasal; belly yellow with blackish blotches.

Hab.—North Carolina and Florida to Texas; up the Mississippi valley, probably to Illinois.

CROTALUS L.

Syst. Nat., Ed. X, 214; B. and G., *l. c.*, 1; Cope, *l. c.*, 686, and Rep. Nat. Mus., 1149; Boul., *l. c.*, III, 572.

A pair of large erectable, perforated poison fangs in front of the upper jaw; no other maxillary teeth; loreal pit and rattle present; top of head covered with small scales; scales keeled (outer sometimes smooth), with pits, in 23–31 rows; anal and subcaudals not divided. Size medium or large.

Hab.—North and South America.

Notwithstanding the wide range of this genus, through the whole of America from lower Canada to Brazil, its members form a very compact group and though many of the species resemble each other closely, there is a curious absence of transitional characters, so that it is necessary to recognize as distinct species, forms as closely similar as *adamanteus* and *atrox*, as well as *confluentus* and *oregonus* (= *lucifer* B. and G.), in which the differences, though slight, are, as far as I can discover, absolutely constant.

Key to the Species of the United States.

A.—Anterior nasal in contact with rostral:
a.—Back with chevron-shaped cross-bands; tail black. 1. *C. horridus.*
b.—Back with spots; or cross-bands posteriorly:
a^1.—Rostral as high or higher than wide; 3–5 scales between suboculars and labials:
a^2.—Dorsal spots lozenge shaped:
Lozenges distinct; a light vertical line in front of nostril; bands on tail not very distinct, 2. *C. adamanteus.*
Lozenges with angles cut off; no light line in front of nostril; tail white with black bands, 3. *C. atrox.*
b^2.—Dorsal spots rhomboid; cross-bands behind:
Head scales larger; dark streak beginning at anterior corner of eye, . 4. *C. confluentus.*
Head scales smaller; dark streak beginning at posterior corner of eye, . 5. *C. oregonus.*
c^2.—Dorsal spots with a light centre on each side of the median line, ... 6. *C. molossus.*
d^2.—Dorsal spots small, in two rows, . 7. *C. pricei.*
b^1.—Rostral wider than high; 2 scales between suboculars and labials:
a^2.—Supraoculars not produced into a horn:
Spots anteriorly; cross-bands behind, 8. *C. tigris.*
Greenish, with black cross-bands, 9. *C. lepidus.*
b^2.—Supraocular produced into a horn, 10. *C. cerastes.*
B.—Anterior nasal separated from rostral by scales, 11. *C. mitchelli.*

Crotalus molossus B. and G.

l. c., 10; Cope, *l. c.*, 689, and Rep. Nat. Mus., 1154; Stej., *l. c.*, 424; *C. terrificus* (part) Boul., *l. c.*, III, 573.

Snout broad; rostral rather small, its width about equal to its height; scales on top of the muzzle larger than in any other North

American species, and usually about eight in number; five or six rows of scales between supraoculars, often two larger ones in front; four or five rows of scales between the suboculars and upper labials; 29 rows of dorsal scales; ventrals 187–203; subcaudals 25.

Length about 1,400 mm.

Sulphur yellow above; tail black or dark brown; dorsal spots chestnut brown, transversely wide and irregularly lozenge shaped, usually lighter in the centres of their lateral parts; these spots are commonly prolonged down to the ventrals; belly yellowish, clouded posteriorly; a dark oblique streak behind the eye.

Hab.—New Mexico, Arizona and Sonora.

In the size and arrangement of the plates on the muzzle, this species approaches *C. durissus* of South America..

Crotalus adamanteus Beauvais.

Trans. Am. Phil. Soc., IV, 368 (1799); B. and G., *l. c.*, 3; *C. a. adamanteus* Cope, *l. c.*, 690, and Rep. Nat. Mus., 1161; *C. durissus*[24] Boul., *l. c.*, III, 578; *C. adamanteus* Stej., *l. c.*, 432.

Largest of the genus; head broad behind, triangular; rostral higher than wide; usually two plates on the muzzle behind the nasals, the rest of the head covered with small scales; 6–8 rows between supraoculars; 3–5 rows between suboculars and labials;

[24] There has been disagreement as to whether the Linnæan name *durissus* belongs to this or to the South American species. Mr. Boulenger adopts it for this species and uses *terrificus* Laur. for the South American. To me the case appears otherwise. Linnæus' scanty description does not sufficiently indicate either, but examination of his references, to determine the basis of his species, shows that Seba's plates best indicate the South American form, and in the text (Seba, II, 99) Mexico is the most northern locality referred to. Linnæus' paper in the *Amœnitates Academicæ*, I, 500, and Gronovius both treat of specimens from South America; while the only North American rattlesnake apparently known to Kalm was the most northern of all (*horridus* L.). It appears then that *durissus* L. is a compound, not of the South American and the diamond rattlesnakes, but of the former and the Northern banded species. But Linnæus' description, "*Albo flavoque varius, maculis rhombeis disco albis*," cannot apply to the latter; *durissus*, therefore, should be restricted to the South American form. Laurenti's description of *terrificus* is not much more ample than that of Linnæus, but he refers his species to Seba's Pl. 95, fig. 1, in which the only recognizable detail, the scutellation on the muzzle, most clearly indicates the South American species; *terrificus* Laur. is, therefore, a synonym of *durissus* L.; *durissus* Laur. is a compound of Linnæus' description, above quoted, and Catesby's Pl. XLI, Vol. ii, which is *horridus*. I am unable to find evidence than any of these authors knew of the existence of a rattlesnake in North America other than *horridus*; and the large diamond rattlesnake of the Gulf States remained unrecognized until 1799, when Beauvais applied to it the name *adamanteus*.

scales in 27–29 rows, as in most of the species the first and second rows are faintly keeled or smooth; ventrals 169–178; subcaudals 25–32. The largest specimen I have seen, measured 1,910 mm. and came from St. Simon's Island, Ga. It was formerly in possession of the Zoölogical Society. There is little doubt that the species reaches 2,200 mm. or more.

Yellowish gray above, with lozenge-shaped dorsal blotches sharply defined, blackish, with centres of the body color, and separated by oblique yellow lines crossing each other on the back; on the sides in the triangular open spaces which alternate with the lozenges, there is a black spot; other indistinct markings sometimes appear on the sides; posteriorly the colors are somewhat darker and the lozenges take the shape of cross-bands, which form not very well-defined rings on the tail, but the colors there are not sharply contrasted; belly yellowish white, clouded with brown toward the sides. There is a wide dark oblique streak from below the eye to the labials, bordered in front and behind by a light one; two light bars from the loreal pit to labials, and another in front of the nostril.

Hab.—North Carolina and Florida; west to Louisiana and probably eastern Texas.

Crotalus atrox B. and G.

l. c., 5.

The western representative of the diamond rattlesnake is very like it in appearance, but may always be distinguished by the absence of the light vertical line in front of the nostril, by the absence of sharply defined angles to the dorsal spots and by the strongly contrasted black half rings on the tail. A rare form, known only from southern California, is retained as a subspecies.

Color grayish or brown; markings distinct, . . 1. *C. a. atrox.*
Color red; markings not very distinct, . . . 2. *C. a. ruber.*

Crotalus atrox atrox B. and G.

l. c., 5; *C. adamanteus atrox* and *C. a. scutulatus* Cope., *l. c.*, 690, and Rep. Nat. Mus., 1164, 1159; *C. scutulatus* and *C. confluentus* (part) Boul., *l. c.*, III, 575, 576; *C. atrox* Stej., *l. c.*, 436.

Size rather less than *adamanteus*, but form and scutellation very similar; the supraoculars are sometimes but not always bordered internally by a row of enlarged scales; rows of scales between supraoculars often 4, but sometimes 5 or 6; 3–4 scales between

suboculars and labials; scales in 27–25 rows; ventrals 173–187; subcaudals 23–28. Of many specimens the largest I have seen measured 1,670 mm.

Yellowish or grayish, sometimes quite brown, with a series of dark brown or black dorsal spots, with centres of the body color; the angles of the spots are not sharp as in *adamanteus*, but are cut off, forming irregular hexagons; the lateral markings are indistinct; tail gray or white, with 3–5 dark brown or black half-rings; belly yellowish, more or less clouded on the sides. The oblique streak behind the eye is present, but the light line in front of the nasal is always absent. Some young examples have a narrow light line across the middle of supraoculars.

Hab.—Central Texas to Arizona; northern Mexico.

Crotalus atrox ruber Cope.

l. c., 690; *C. confluentus* (part) Boul., *l. c.*, III, 576; *C. a. ruber* Stej., *l. c.*, 439; *C. ruber*, Van Den., *l. c.*, 222; Cope, Rep. Nat. Mus., 1167.

Size smaller than *C. a. atrox;* rostral wider; canthus less distinct; head scales small; 8 rows between supraoculars; 5 between suboculars and labials; 27 rows of scales; ventrals 183–186; subcaudals 22–26.

Length about 1,300 mm.

Pale red; dorsal spots darker red; lateral spots and head markings indistinct, although a specimen from San Diego, formerly living in the Zoölogical Gardens, plainly showed the oblique streak behind the eye; belly yellowish; tail whitish with black cross-bands.

Hab.—Southern California.

A better acquaintance with this rare snake may require that it be given specific rank, especially as Mr. Van Denburg does not include *C. a. atrox* in his list of California snakes.

Crotalus confluentus Say.

Long's Exp., II, 48 (1823); B. and G., *l. c.*, 8; *C. c. confluentus* and *C. c. pulverulentus* Cope, *l. c.*, 692, and Rep. Nat. Mus., 1170, 1174; *C. confluentus* (part) Boul., *l. c.*, III, 576; *C. confluentus* Stej., *l. c.*, 440.

Body rather slender; rostral higher than wide; no very distinctly enlarged plates behind the nasals; head scales of moderate size, 3–6 between supraoculars, 2–4 between suboculars and labials; 27–29 rows of scales; ventrals 173–188; subcaudals 23–28.

Length about 1,400 mm.

Grayish or yellowish brown, with a dorsal series of subquadrate dark brown blotches with rather lighter centres, and sometimes a yellowish border; the corners are often rounded, and posteriorly the spots become cross-bands; two series of smaller alternating blotches on the sides; belly dull yellow; a transverse light line on the centre of the supraoculars, which widens and sometimes bifurcates internally; in the young this is very distinct and the anterior arm of the bifurcation is continued across the vertex to meet its fellow; the oblique eye streak begins very constantly at the lower anterior corner of the eye and is bordered by narrow white lines; a light line below loreal pit, and the borders of the rostral are light in the young.

Examination of the type of *C. c. pulverulentus* Cope does not afford any good ground for distinction.

Hab.—Southern Manitoba to central Texas; west to Idaho and Arizona.

Crotalus oregonus Holbrook.

No. Am. Herp., III, 21, Pl. 3 (1842); *C. lucifer* and *C. oregonus* B. and G., *l. c.*, 6, 145; *C. a. adamanteus* (synonomy), *C. confluentus lecontii* and *C. c. lucifer* Cope, *l. c.*, 690, 692; *C. confluentus* (part) Boul., *l. c.*, III, 576; *C. lucifer* Stej., *l. c.*, 445, and No. Am. Fauna, No. 7, 218; Van Den., *l. c.*, 216; *C. c. lecontei* and *C. c. lucifer* Cope, Rep. Nat. Mus., 1175, 1176.

Examination of the type of *C. oregonus* Holb. leaves me with little doubt that it is identical with *lucifer* B. and G. The specimen has become much distorted and shriveled during the sixty years since Holbrook examined it, but it shows no important difference in scutellation. There are 6 scales between the supraoculars; 3 between the suboculars and labials; 25 rows of scales. Holbrook's plate does not quite correctly render the color pattern; the dark streak behind the eye begins further back than is shown, and really takes origin as in *lucifer*, posterior to the centre of the eye. The dorsal spots are not as emarginate on the anterior border as many of them are represented in the plate; they are, in fact, sharply angled, giving a superficial resemblance to *adamanteus* (which can be the only reason why Cope includes it in the synonomy of that species); but much weight cannot attach to this single point in which the specimen differs from *lucifer*, for the reason that the epidermis has long since peeled off, leaving the whole pattern accentuated; and the youth of the animal (315 mm.

long) would also show these lines more sharply defined than they would become later in life. The transverse light line on the supraoculars is precisely as in *lucifer*.

This species comes very near to *confluentus*, but, on account of the constancy of the slight differences, I am obliged to give it specific rank; the head scales are rather smaller, the rows between supraoculars numbering in six examples 4, 5, 8, 8, 8, 9; between suboculars and labials 2–4; scales in 25–27 rows; ventrals 165–189; subcaudals 18–26. Size about the same as *confluentus*. The pattern is closely similar, but the dark oblique streak behind the eye always begins posterior to its centre and runs backward directly to the angle of the mouth, not curving downward as sharply as in *confluentus;* the light lines bordering it are wider; the transverse light line on supraoculars is present; the belly is yellow or greenish, with the posterior border of each ventral lighter. In some specimens the general color is dark, approaching even to black.

Hab.—The Pacific coast; California to British Columbia, Idaho and northern Nevada and Utah.

Crotalus horridus L.

Syst. Nat., Ed. X, 214; *C. durissus* B. and G., *l. c.*, 1; *C. horridus* Cope, *l. c.*, 693, and Rep. Nat. Mus., 1185; Boul., *l. c.*, III, 578; Stej. *l. c.*, 426.

Size smaller and body more slender than in *adamanteus;* rostral high; two rows of small plates behind nasals; 4–8 scales between supraoculars; 2–4 between suborbitals and labials; usually but one plate on canthus; scales in 23–25 rows (occ. 27); ventrals 165–178; subcaudals 18–25.

Average specimens are about 900 to 1,000 mm. long, and it is doubtful if the species ever much exceeds 1,400.

The body color is variable—sulphur yellow, ashy and almost black (one specimen from Alabama was in life a peculiar pale drab), crossed by twenty or more irregular chevron-shaped black bands; the bands are sometimes complete, but often broken into angular spots on the sides, but they always have a ragged or zigzag appearance. The tail is black; belly yellow marked with dusky; head dark, without distinct markings.

Hab.—New England to northern Florida; west to Iowa, Oklahoma and northern Texas.

Crotalus tigris Kennicott.

U. S. Mex. Bound. Surv. Rept., 14, Pl. IV (1859); Cope, *l. c.*, 693, and Rep. Nat. Mus., 1181; Boul., *l. c.*, III, 580; Stej., *l. c.*, 449, and No. Am. Fauna, No. 7, 214; Van Den., *l. c.*, 220.

Body rather slender; rostral wider than high; two rows of small plates on the muzzle; about six rows of scales between supraoculars; generally two rows between suboculars and labials; scales in 21–23 rows (occ. 25); ventrals 170–181; subcaudals 19–21. Length about 800 mm.

Grayish or yellowish, with a dorsal series of rather small dark blotches and an indistinct lateral series; on the posterior two-thirds of the body the spots are replaced by cross-bands; belly whitish or yellow; a dark oblique streak behind the eye.

Hab.—Arizona, southern Nevada and southern California.

Crotalus lepidus Kennicott.

Proc. Acad. Phila., 1861, 206; Cope, *l. c.*, 692, and Rep. Nat. Mus., 1191; Boul., *l. c.*, 582; Stej., *l. c.*, 452.

Size small; rostral wider than high; eight plates on top of muzzle; 3–4 rows between supraoculars; 2 between suboculars and labials; one nasal, half divided; the upper preocular divided vertically; scales in 23 rows; ventrals 153–169; subcaudals 27–31. Length 600 mm.

Greenish gray, with about 20 dark brown or black dorsal spots; tail with several dark half-rings; belly whitish clouded with brown; two large dark spots in contact on the nape; the dark oblique streak behind the eye is sometimes indicated.

Hab.—Western Texas to central Arizona; northern Mexico.

Crotalus cerastes Hallowell.

Proc. Acad. Phila., 1854, 95; Cope, *l. c.*, 694, and Rep. Nat. Mus., 1196; Boul., *l. c.*, III, 583; Stej., *l. c.*, 450, and No. Am. Fauna, No. 7, 216; Van Den., *l. c.*, 222.

Size small; rostral as wide as high; head scales small, 5–7 between supraoculars; 2 between suboculars and labials; one nasal; supraoculars elevated into a horn-like projection; scales in 21 rows; ventrals 134–146; subcaudals 16–21. Length about 600 mm.

Yellowish, with a dorsal series of small brown blotches, and several indistinct series of smaller ones on the sides; belly yellowish; a narrow oblique streak behind the eye.

Hab.—Arizona, southern Nevada, Utah and California.

Crotalus pricei Van Denburg.

Proc. Cal. Acad. Sci., 1895, 856; Cope, Rep. Nat. Mus., 1184.

This species is known from five small specimens in the museum of the Leland Stanford University, California.

From Mr. Van Denburg's description it appears to be characterized by a rostral slightly higher than wide; enlarged plates on the muzzle; one to three rows between supraoculars; one row between suboculars and labials; and the presence of but nine upper labials, the number in other species being 12–18; 21 rows of scales; ventrals 153–159; subcaudals 21–27. Length to rattle 447 mm. (tail 41).

Olive gray, thickly covered with small brown dots. Fifty-four to sixty small brown blotches arranged in two series on the back, somewhat alternating anteriorly, but forming cross-bands behind; seven brown cross-bands on the tail; two or three rows of smaller alternating brown spots on the sides; belly dark slate, ends of the ventrals and outer row of scales whitish; a dark brown oblique streak behind the eye; two small brown spots on the occiput; throat yellow tinged with vinaceous.

The peculiar characters of these specimens are quite sufficient, as far as they are now known, to entitle them to recognition.

Hab.—Huachucha Mountains, Arizona.

Crotalus mitchelli Cope.

Proc. Acad. Phila., 1861, 293; *C. mitchellii* and *C. pyrrhus* Cope, *l. c.*, 694; *C. mitchelli* Boul., *l. c.*, III, 580; *C. mitchellii* Cope, Rep. Nat. Mus., 1193; *C. m. mitchelli* and *C. m. pyrrhus* Stej., *l. c.*, 454, 456; *C. mitchelli* Van Den., *l. c.*, 224.

Differs from all others of the genus in having the rostral separated from the anterior nasal by small granular scales; canthus not sharp and without large plates; 6–7 scales between supraoculars; 3 rows between suboculars and labials; preocular sometimes divided; 23–25 rows of scales; ventrals 178–198; subcaudals 26.

Length about 1,100 mm.

Ordinary specimens are grayish yellow, with brown punctulations on the back, which are collected into about forty transversely angular spots, which form cross-bands on the posterior fourth of the body; tail light with distinct black half-rings; an indistinct brown streak behind the eye, with a light one in front of it. Occasional examples are more or less red of varying shades; upon such specimens *C. pyrrhus* Cope was founded.

Hab.—Arizona and southern California.

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